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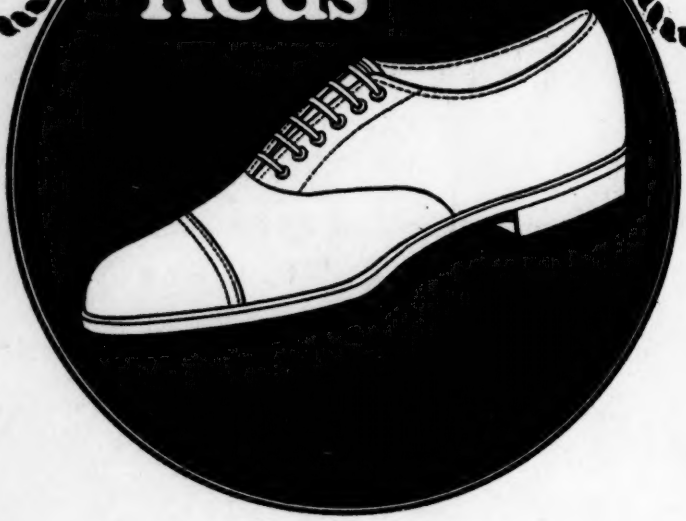

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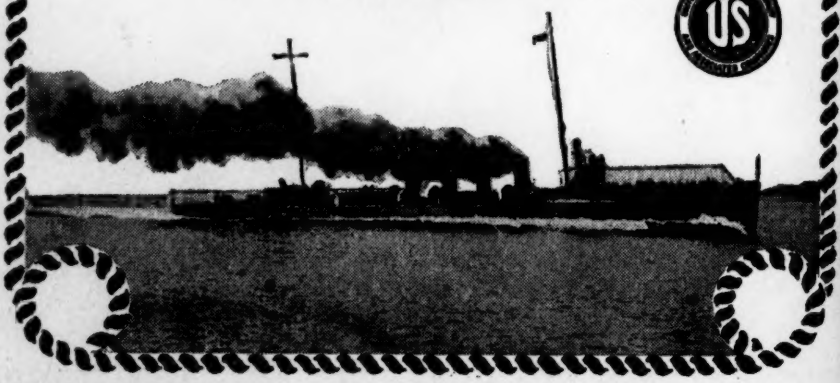

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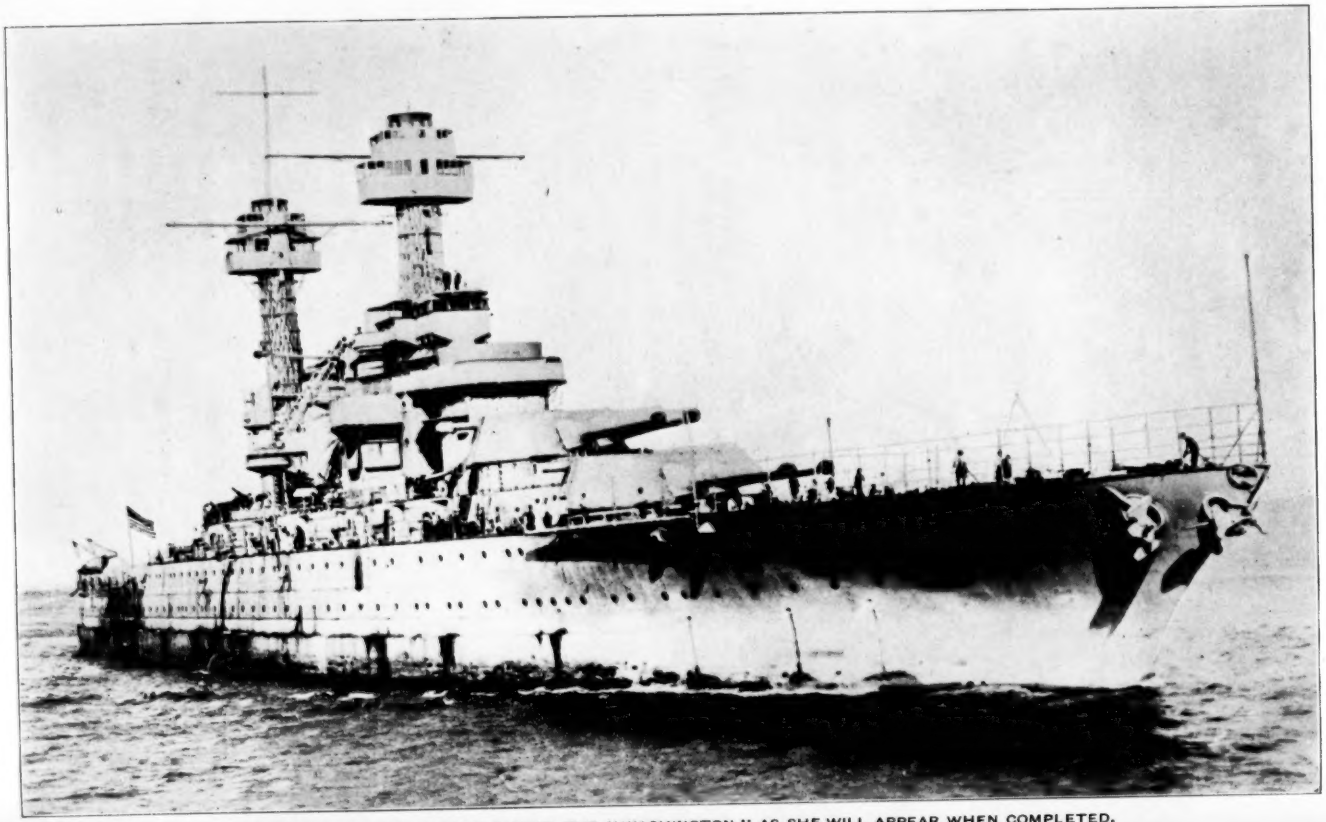

UNCLE SAM'S LATEST DREADNOUGHT, THE "WASHINGTON," AS SHE WILL APPEAR WHEN COMPLETED.

UNCLE SAM'S LATEST DREADNOUGHT, THE "WASHINGTON," AS SHE WILL APPEAR WHEN COMPLETED.

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. 48, No. 1 JANUARY, 1922 Whole No. 227

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVAL TRAINING

By COMMANDER JOHN E. POND, U. S. Navy

FOREWORD

Having read in one of the service papers that the Secretary of the Navy has sent out a special invitation for suggestions from the naval personnel as to the adoption of economical methods, I feel safe in assuming that since the desire for economy is manifestly sincere these somewhat radical views on the subject of naval training will be well received by the Department and by the service in general. Their adoption would surely result in economy.

The Department's order as published reads:

> For the purpose of co-operating to the fullest extent with the administration in its expressed policy of reducing expenditures of the government to the lowest basis consistent with efficiency, the department desires that suggestions and constructive criticism be submitted by anyone connected with the naval establishment, which tend to point out more economical methods of administration than those now in force in the Navy Department and in connection with the operations of the U. S. naval vessels and stations.
>
> The criticism and suggestions herein referred to need not be confined to matters within the scope of the particular duty of the person making them, but it is directed they be addressed to "The Secretary of the Navy (Budget Officer)," submitted via the usual channels to insure the department having the benefit of the endorsement and comment of the senior officials.

Before proceeding with my suggestions I must refer the reader to an article written by me and published in the U. S. NAVAL

INSTITUTE PROCEEDINGS, Vol. 47, No. 7, Whole No. 221, July, 1921, and particularly to page 1004 wherein I proposed defining the status of " ships in active reserve " as follows:

Vessels in this condition are fully officered, but with reduced crew sufficient only to maintain the vessel in material readiness for service and to perform such operations as may be necessary to insure efficient performance of the material. Such vessels are attached to the active fleets and are available to replace vessels of the active fleets on short notice. They are also available as practise ships for the Naval Reserve Force, the Naval Academy, and other training purposes.

Also to page 1010:

Ships in active reserve should be detailed for training the first reserve.

At least two such ships should be detailed to this duty at each reserve base. If the number of first reserves applying for training require it, two groups of such ships should be detailed for this purpose.

These ships should be employed alternately throughout the year in cruises of about one month's duration.

The itinerary and schedule of operations for each of these cruises should be published well in advance by the commander-in-chief of the fleet to which attached.

SUGGESTIONS

In line with these two quotations and the Department's invitation, I respectfully submit the following suggestions:

1. Abolish training stations and substitute receiving stations and training ships (augmented, of course, in time of war, with temporary training camps).

2. Abolish receiving ships afloat, and substitute receiving barracks.

3. Remove trades schools from industrial navy yards, and concentrate the trades schools' activities ashore at the reserve bases or the receiving stations.

4. Revise curriculum of trades schools to provide: *Theoretical Instruction ashore,* illustrated with models and supplemented by visits to industrial plants; and *Practical Instruction at sea* in training ships, repair ships, tenders, hospital ships or store ships.

5. Limit the activities of the Ninth Naval District to administration and training of naval reserve force, recruiting, inspection, supply and transportation.

6. Operate *Recruit Training Ships* from the two main naval bases only, namely: Hampton Roads and San Francisco.

7. Re-organize the naval reserve force in two classes only, namely: First reserve and second reserve.

8. Organize the first reserve in ship units and definitely assign them to the billets they are to fill in the reserve ships if called to active duty in case of national emergency.

9. Pay retainer pay to the first reserve only.

10. Operate "Ships in active reserve" for naval reserve force training from all reserve bases. (This includes the recruit training ships mentioned in suggestion No. 6.)

TRAINING STATIONS

My first and paramount suggestion is that training stations as such be abolished, and that the land, buildings and plant equipment thus released be converted to other naval purposes or otherwise disposed of as may be considered most consistent with the requirements of the national budget.

The service now rendered by training stations would better be accomplished by two separate activities in time of peace, namely, receiving stations and training ships; augmented in time of war by temporary training camps located preferably at lakes or harbors near various centers of population throughout the country.

The money spent in operation and maintenance of existing training stations and now appropriated for the construction of a new training station at San Diego, California, would give greater return in efficiency if invested in receiving stations at the principal bases or centers of naval activities and in the operation of a few more ships in commission.

The personnel released would be more effectively employed afloat, and the recruits would be better trained while being used to operate training ships. The truth of this last statement will be apparent to the reader when he has read all I have to say.

RECEIVING SHIPS

The contention that it is cheaper to construct and operate quarters and messing facilities on shore than to convert obsolete ships and operate them as receiving ships admits of no argument.

I suggest that the existing receiving ship activities be concentrated in one receiving barracks at each of the naval bases or centers of naval activities. By this I mean concentrated at a suitably selected site in a port that is used for the operation and mainte-

nance of a fleet or unit thereof, the principal factors governing the selection of such site being proximity to transportation terminals and to the usual anchorage ground of naval vessels.

The reasons for maintaining receiving ships at navy yards, regardless of whether such navy yards are located at such natural centers of naval activities as I have just described above appear to me to be purely reasons of expediency. They are:

(a) To provide quarters, pay and subsistence for enlisted personnel necessary for the operation of yard craft and other navy yard activities under the captain of the yard and for operation of radio stations at navy yards.

(b) To provide a commanding officer for such enlisted personnel who, by virtue of his status as commander of a naval vessel, is empowered to order summary courts martial and deck courts, thereby relieving the commandant of the details of administering justice by personal investigation of and punishment for minor offenses.

Such simple difficulties of administration and discipline as these can easily be overcome by:

(a) Empowering the captain of the yard to convene summary courts martial and deck courts under the authority of the Act of August 29, 1916.

(b) Carrying the enlisted personnel pay accounts on the rolls of the yard disbursing officer.

(c) Commuting the ration allowance and permitting the men to subsist themselves at the yard cafeteria.

(d) Quartering them on yard craft or in houses on shore under the supervision of the captain of the yard.

TRADES SCHOOLS

I suggest removing trades schools from industrial navy yards; concentrating all trades school activities of a district at a reserve ship base, or at or near the site selected for receiving station or barracks; limiting the courses at these trades schools ashore to theoretical and academic instruction; and completing the courses by practical instruction afloat. I consider that the atmosphere and environment of the industrial navy yards are most unsuitable and undesirable, and, through their influences, are especially detrimental to the discipline, application and well-being of enlisted men under training or in trades schools.

Thus far my suggestions may look like a policy of destruction. I now come to the constructive part of my first and paramount suggestion, namely: to abolish training stations and substitute receiving stations and training ships.

RECEIVING STATIONS

Receiving stations should be maintained at the main naval bases for the purposes of receiving, detention, outfitting, housing, subsisting, paying, administering of justice and discipline in connection with, and discharging or releasing of all transient personnel, both officer and enlisted, passing through the base.

Briefly, the facilities of a model receiving station would include the following:

1. Administration building.
2. Quarters for commanding officer and heads of departments.
3. Quarters for transient officers.
4. Quarters for station crew.
5. Receiving barracks for recruits with parade ground and tent platforms for emergency expansion.
6. Receiving barracks for incoming enlisted transients or casuals.
7. Mess hall.
8. Draft house for outgoing drafts.
9. Sick bay and dispensary.
10. Club.
11. Swimming tank.
12. Target gallery.
13. Boat harbor with boat house and marine railway for small boats.
14. Wharf with suitable depth alongside for accommodating tugs and other small craft used in transporting drafts.
15. Power house and small shops.

TRAINING SHIPS

Referring again to my article on "The Relation of Personnel to Matériel" and particularly to the pages 1004 and 1010 as quoted in the early part of this paper, I suggest the following system of recruit training:

At the reserve base of a main naval base, or at or near the receiving station of such main naval base, *i. e.*, at Hampton Roads and

at San Francisco, maintain two capital ships "in active reserve," or two groups of such ships if recruiting activities warrant it, for training purposes.

Send these ships on training cruises alternately throughout the year, the length of cruise to be that which is determined to be necessary to produce the degree of training required, probably about one month.

These cruises to be open to members of the naval reserve (see page 1010, "The Relation of Personnel to Matériel") as well as to recruits under training for the regular navy and to students to complete the practical courses of trades schools.

Recruits arriving at the main base receiving stations would be outfitted, passed through detention, and taught the manual of arms, elementary naval terms, salutes and customs, semaphore, swimming, infantry drill and target gallery practice. They would remain at the recruit barracks not less than three weeks (period of detention) and not more than one month (unless held as a punishment) before embarking on one of the training ships.

After arrival on board the training ship they would remain in port not less than one week and not more than one month (if the cruises were of one month's duration) before putting to sea for their training cruise.

During this one month trick in port the men assembling for the cruise would be organized, assigned billets, and instructed in ship duties.

From the training ships they would go directly to ships of the fleet or back to the receiving station, as transients if they desired to avail themselves of the 10 days leave allowed recruits upon completion of training, and as students if they enlisted for one of the recruit trades schools.

NAVAL RESERVE FORCE

Suggestions numbers 7, 8, 9 and 10, although coming under the general subject of "Naval Training," are a little beyond the scope of this paper. They are covered more fully in my paper on "The Relation of Personnel to Matériel," and will be made the subject of a future paper, but are reiterated here because I believe they are in line with the Department's expressed desire for suggestions that may lead to economy and because I believe that the naval reserve

force should be maintained and trained for the specific duties its members are to perform in time of war or national emergency.

CONCLUSION

These suggestions are intended as the basis of a policy and not as arbitrary or set rules to be followed explicitly in all cases. For example, it may be more economical and expedient to continue receiving ships afloat at certain stations. Also it is not intended to propose moving the seamen gunner's schools (torpedo and deep sea diving classes at Newport and ordnance class at Washington).

I give hereunder my views as to the merits of and results to be expected from the proposed system in comparison with the present system of recruit training. These views are based especially on my experience as commander of a reserve torpedo flotilla voluntarily engaged in training the naval militia of California, 1912-1914; as senior engineer of the U. S. S. *Pittsburg* engaged in training petty officers and reservists for the fleet while cruising the South Atlantic, 1917-1918; as executive officer of the U. S. S. *Ohio* engaged in training recruits while operating in the Chesapeake Bay and "behind the net at Base Two," 1918; and more recently as executive officer of the U. S. Naval Training Station, San Francisco, California, during the various drives and demobilizations of the past year.

AS REGARDS MORALE

Under the present system recruits are kept too long on training stations ashore. Many men at mast give excuses for misconduct, overstaying leave, jumping ship, etc., that they wanted to get away and go to sea and had become restless, disappointed and disgusted.

Although the period of training is supposed to be 12 weeks for firemen and 16 weeks for seamen, some men are inadvertently or through necessity held for much longer periods to the detriment of their morale.

The consensus of opinion of the officers of the drill department at this training station (San Francisco) is that the average recruit is at his best as regards morale and aptitude for absorbing recruit knowledge at the end of about one month's training, and from that point he goes down hill in this respect until transferred to a ship.

The effect of the proposed system would be to keep up interest throughout the entire period of training. At the end of three to

four weeks period of detention and training at recruit barracks the men would be on tip toe with anticipation and curiosity. Once a week, say every first, second and third Monday, a batch of recruits would leave the recruit barracks to join their training ship. Those finishing detention after the third Monday would have to wait over for the next ship until the first Monday of the next month, but during this wait could be given special liberty privileges. Do you think there would be any over-timers or laggards on Monday morning? Would any more severe punishment be needed for minor offenses at recruit barracks than "one week extra detention"?

During the next one week to one month period of training on board ship while organizing and preparing for sea the men would be constantly on the qui vive and in a receptive and inquisitive mood, ready to absorb every bit of information and instruction given them about their ship, nomenclature and purposes of its parts, ship's data, etc. Even the late comers would derive benefit from the instruction given the more fortunate earlier arrivals, through their greater inquisitiveness and desire to catch up with their better-informed shipmates. During this period some infantry and artillery drills and perhaps some small arms target practice could be held ashore, and during the last week some boat drill under oars.

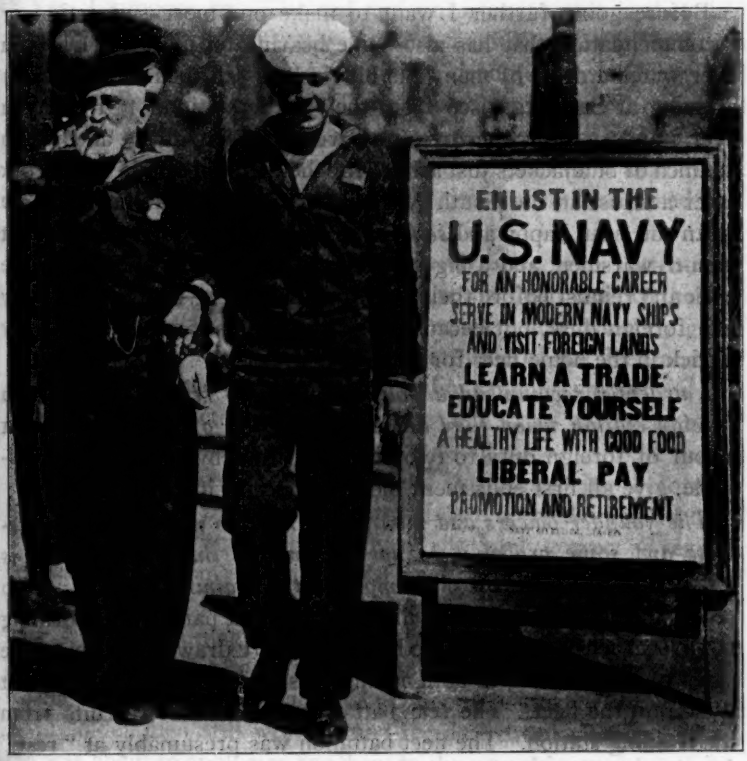
Then comes the cruise, the very thing those youngsters enlisted for! The promises of the recruiting posters are being fulfilled! Liberty occasionally in a strange port! Boats under oars and sails! Fishing and swimming parties! Some elementary form of target practice with the great guns!—perhaps just a few rounds to show them what it is like.

Think of the mutual benefit to be derived from their association with the members of the naval reserve force who are also taking the cruise as their shipmates under identically the same instruction and training. Also from their association with the selected class of men who are taking these cruises for the practical end of their course of instruction at the recruit trades schools such as: yeomen's school, hospital corps training school, signal school, bugler's school, musician's school, preliminary radio school, mess attendant's school and commissary schools.

The artificers, machinists, electrical, optical and other technical trades schools (except seaman gunner's and radio) of course would complete their practical courses on repair ships and tenders; the

storekeepers school (?) on store ships; and the aviation mechanics on airplane carriers or seaplane tenders.

Think of the "class spirit" and resulting association and lasting comradeship that would be engendered and fostered among those who had taken part together in one of these cruises. Men would reckon the beginning of their naval careers from the dates of these first cruises, as—"I joined with the Pacific class of August, 1921."



Most young recruits join the navy with the idea of becoming real man-o'-warsmen. The height of their ambition is to go to sea in a modern battleship. How many would sign up for a first enlistment if they realized that they might have to go from the training station to an auxiliary cargo ship, a collier, a "beef boat," or a district tug, and might even have to spend their entire enlistment on that kind of a "packet"? Some men may prefer that kind of duty later on, but recruits do not enlist with that in view.

Upon returning from one of these training cruises, the recruits would have seen just enough of the real navy to clinch their determination to remain man-o'-warsmen. By giving them the privilege of 10 days recruit leave with travel time to their homes, every one of them who availed himself of the privilege would become an enthusiastic recruiter.

AS REGARDS EFFICIENCY

Before going further I want to make one more suggestion or recommendation that has also some bearing on morale. Did you ever watch a draft of men (the bluejackets call them "Asiatics") arriving at San Francisco from the Asiatic station? Or did you ever stand at the corner of 96th Street and Broadway and watch a bunch of bluejackets just ashore for their first liberty in New York after a cruise in the South Atlantic or the Mediterranean? How clean cut, neat, happy and *self-reliant* they look! They are efficient man-o'-warsmen, and a big percentage of them are going to come back and reinlist before their four months are up—not because they like foreign duty, but because they like the navy and want to try a trick in the home fleet for a change.

I urgently recommend a policy of sending recruits direct to a foreign station when they finish their period of training. Limit a tour of foreign duty to two years and thereby, so far as practicable, give all first enlistment men a chance at it.

The younger officers and men of the fleet do not seem to appreciate and some probably do not approve of the training that is given recruits after the first month at a training station. Two recent incidents will serve to illustrate this: A parade was forming for a local celebration and two battalions were drawn up on opposite sides of the street and both facing west. The battalion in front was from the fleet. The rear battalion consisted of recruits from the training station. The fleet battalion was presumably at "rest," as the next command given was "attention" and not "fall in." The training station battalion was "at ease." In either case the men should keep one foot in place and maintain their position in formation. The men from the fleet were engaged in guying the recruits, laughing and talking and passing such remarks as "Rookie," "Boots," etc. The officers of the fleet battalion, who were nearly all senior to the officer commanding the recruit battalion, seemed to be getting a good deal of enjoyment out of the

performance. The recruits maintained their military bearing. Finally the recruit battalion commander lost patience and approached one of the fleet company commanders, and the following conversation ensued:

Fleet company commander (Lieutenant) (starting the conversation): "A recruit's a recruit, isn't he, and always gets some razzing?"

Recruit battalion commander (Junior Lieutenant) (replying): "Yes, I suppose so. The sad and unfortunate part is that they don't stay a recruit. If you will take a careful look at my battalion you will notice that they are all in neat, clean, proper uniforms and conduct themselves as a well-disciplined organization. I shall probably see these same men ashore in a parade in six months from now, and instead of a clean, neat, snappy organization as they are now, they will be a slouchy, non-regulation, poorly disciplined outfit like that there!"

The company indicated was immediately brought to "attention."

I can vouch for the truth of the above incident, but not the following, which was brought to me as hear-say and is merely given for what it is worth as indicating the attitude of the fleet, and the resulting influence on the recruit who cannot comprehend the necessity for strict military discipline and strict enforcement of uniform regulations at the training station.

A captain had arrived to command a battleship. Just before his first inspection of the crew a large draft had arrived on board from the naval training station. They were absolutely correct as regards regulation uniform (Paymaster's issue) and had complete and immaculately clean bag outfits (I can vouch for this part) when they left the training station. The executive officer of this ship had been trying for some time to get his crew into regulation uniforms, and was rather chagrined at this inspection to see so many of his older men still wearing non-regulation tailor-made clothes. He was about to apologize for them to the new skipper, when much to his surprise the latter pointed out the recruits and commented unfavorably upon the appearance of their uniforms. Needless to say, the executive passed the word that thereafter it would be the policy of that ship to encourage the wearing of "good looking" (?) tailor-made clothes.

Next time the fleet is in port see if you can find any seamen second-class or firemen second-class on liberty. You probably

won't be able to see their stripes at all on account of their long tight-fitting non-regulation sleeves, which hang down so far as to completely hide their cuffs. Ask them to pull up their sleeves and you will find them all wearing three stripes—all seamen or firemen first-class!

The above illustrations are not intended as a criticism of the discipline of the fleet, but are given to illustrate my point that the recruit training (after the first month) could be better accomplished on board training ships, which, as a part of the fleet, would be under the same regulations and would therefore serve as models as regards military bearing and uniform.

Strict military discipline and enforcement of uniform regulations are necessary at training stations, yet a very difficult problem is presented to the officers and instructors of the training station because the recruits all know the attitude of the officers and the men of the fleet, and naturally they adopt the same attitude themselves, not only towards the uniform regulations of the training station, but unfortunately towards most of the other instruction given them there. They say to themselves: "What's the use, we won't have to do this when we get on board ship?"

Would it not be better to give them most of their training on board training ships, where, instead of being a laughing stock, they would be a model for the rest of the fleet?

To my mind the strictly regulation government issue uniform or a tailored replica of it as regards pattern, cut and color, is far neater and better looking than the outlandish creations produced by the waterfront shysters and affected by most of the "sea-going" (?) bluejackets.

AS REGARDS ECONOMY

I have already briefly pointed out some of the larger economies that would result from (a) abolishing training stations, (b) abolishing receiving ships afloat, (c) concentrating receiving, training, and trade school activities, and (d) removing military activities from industrial navy yards that are not located near the natural centers of naval activities. I might go into further details and stress such small economies as saving in transportation, communication, etc., that would result from (c) and (d).

But there is one big economy that should weigh above all others, because it bears also on the efficiency of the whole navy. *Several thousand men and over two hundred officers would be released*

from shore duty for service in the fleet, and the capital ships thus manned for training purposes would add at least four (two on each coast) effective units to the strength of the active navy.

When we tackle something new, let us do it right and wholeheartedly. Cut out the expediency, especially the political kind. If we happen to be from the vicinity of Great Lakes, San Diego, Newport, Vallejo, New Orleans or Bremerton, and it comes to a choice between our loyalty to our home locality and the best interests of the navy, let us always remember that we are naval officers first and that the best interests of the navy are the best interests of our country.

"Efficiency with Economy"—Efficiency for the navy and Economy for the National Budget! It is up to the navy, and that means you and me. If you believe with me, or have some better suggestions of your own—get busy! It is now up to you. *The Department invites your suggestions.*

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PRINCIPLES OF COMMAND[1]

By REAR ADMIRAL LLOYD H. CHANDLER, U. S. Navy

GENERAL CONSIDERATION

Professor Fulton defines expository writing as being "that kind of writing which has as its primary function the impartial unfolding of any phenomenon, hypothesis or generalization to the understanding of the reader." The subject here presented for consideration is "*The Principles of Command,*" and we therefore have before us an attempt at expository writing which requires that we shall take this term and attempt to set forth "what it is, what are its essential qualities," and "into what kinds it is divided." When, however, we attempt to state "how much it includes," "what it excludes" and "how it differs from other similar ideas," we shall see that it is an all-inclusive term, in that it includes, to a certain degree at least, "all other similar ideas"; that is, it in a measure includes elements of all ideas that are similar to even a remote degree. Therefore the point as to "what it includes" and "what it excludes" can only be covered in a practical way by saying that the principles of command include in a certain degree every principle not widely divergent in character, and that they entirely exclude only such totally divergent principles.

We have an idea to discuss, not a concrete fact, and the first step therefore necessarily becomes one of analysis in order to detect the several elements upon which rest the principles that underlie the power and ability to command. If we do this, and consider each element in turn, we may be able, first, to determine upon what requirements the power and ability to command are based; and then, proceeding synthetically, we may also succeed in envisaging

[1] This paper is prepared by reducing and summarizing a thesis on the same subject prepared by the author in March, 1920, when a student at the Naval War College.

the character and type of man who may be expected to succeed to a high degree in the exercise of command.

POWER AND ABILITY TO COMMAND

The power and ability to command consist of the power to employ men, materials, and natural forces successfully to produce certain desired results. This statement is broad in scope and covers most human administrative activities; it applies to the work of the administrative head of a railroad, of a manufacturing establishment, etc., as truly as it does to a military officer. For purposes of present discussion, however, we will consider only the principles of command as applying to the naval service.

Before proceeding further it will be well to point out the difference in meaning between the two words used above; namely, the *power* and the *ability* to command. Generally speaking the two words might possibly be considered as synonymous, but the writer prefers to consider *ability* as referring more especially to possession of knowledge and of the technical skill to use it, and *power* as referring more particularly to that strength to act and force of character without which knowledge and skill—that is, ability—are of little value. Under these definitions, therefore, the first of our requisites for command is knowledge and that technical skill to use it without which its possession is of no practical value. This is of course a function of the intellect, and the writer has therefore sought to segregate this special idea by his use of the word *ability* to command. This idea is essentially static, and for this attribute to be of practical value to the possessor this *ability* must be set to work; that is, it must *move*. It is to the quality which establishes and maintains such movement that the writer has applied the word *power* to command.

THE RELATIVE IMPORTANCE TO OFFICERS OF HIGH AND OF LOW RANK OF AN UNDERSTANDING OF THE PRINCIPLES OF COMMAND

As the development of the discussion proceeds, it will be noted that the principles involved apply alike to all officers and men possessing any degree of authority and responsibility whatever. The only difference between an officer of high rank and a junior officer or petty officer, so far as the principles of command are concerned, is one of degree and not of principle; the senior must know

and adhere, to the highest degree possible, to *all* the principles involved; whereas the junior may successfully perform the lesser duties that fall to his lot with a far less extensive knowledge of and a far less degree of compliance with such principles. Now as every junior hopes in time to become a senior, it is at once apparent that such junior, as a fundamental part of his task of preparing himself for advancement, should from the beginning consistently endeavor to increase his knowledge of the principles of command and his skill and power in applying them.

In view of the statement made above that the requirements for command are in principle alike for all persons in authority in the naval service, varying in different cases only in degree we may appropriately conduct the discussion of the principles of command mainly from the point of view of the officer of high rank. The one such officer who more than any other is so placed as to require for the successful performance of his duty the highest power and ability to command is he who acts as the commander-in-chief of a large fleet, and this thesis will therefore deal primarily with the principles of command from the point of view of such commander-in-chief.

NECESSITY FOR THEIR BEING UNDERSTOOD AND APPLIED

It need hardly be argued that, in order to be successful in the exercise of any degree of command, it is necessary for the officer or man exercising such command to comply with the principles underlying such command to such degree as is required by the extent of the command. Some men exercise command successfully without greatly considering this subject and perhaps without any really logical understanding of it—such men are born leaders of men and comply with the principles intuitively. That this may have been possible in some cases cannot be accepted as a sound argument that the study of the principles of command may safely be neglected; in fact, it is most probable that such successful commanders have only *seemed* to neglect the study of the science, and have simply failed to leave any considerable record, whether verbal or written, of their thoughts and studies in regard thereto. Be that as it may, it cannot be gainsaid that the born leader will have his peculiar powers enhanced by such study, while the less gifted man may thereby enable himself to pass the line that lies between failure and success.

NATURE OF THE FORCES TO BE COMMANDED

As has already been said, the first step in any discussion conducted for the purpose of determining the principles underlying any particular activity must be one of analysis; the activity in question must, if possible, be resolved into its constituent parts in order that the underlying principles may be discerned and separated one from the other for discussion. In submitting to this process the thought expressed by the phrase *principles of command*, we realize that there are three classes of forces which a commander-in-chief must endeavor to control or command; they being:

1. Forces of nature.
2. Forces flowing from the use of material.
3. Forces flowing from personnel.

Of course it is impossible to really command natural forces, and in implying such command we mean the shaping of our designs in such a manner as will cause them to be served by such natural forces. So we act when we direct our sailing route to take advantage of known or expected weather conditions, current, etc. The forces flowing from material are also subject to actual command in slight degree only. Material is used as a means for directing existing natural forces along certain lines so that they will become useful to us, as when we use the machinery plant of a ship to transform the energy stored in the fuel into propulsive energy applied to the ship. We can control or command such forces in a sense, it is true, but in exercising such control we must be guided by the natural laws governing their action. While the use of these forces as an element in war is a function of the commander-in-chief, the actual field of the fitting of material to so render natural forces useful is primarily that of the scientist, inventor, designer, and constructor, who furnish the material, and the part of the commander-in-chief is to understand the subject and to use such material effectively and within the limits of its capabilities. The forces flowing from personnel are those which an officer, be he commander-in-chief or other, can most greatly influence; command; control. By the creation of high morale, *esprit de corps*, loyalty, etc., he can exalt these forces to the utmost, and by failure to do this he can bring about disaster; thus Mahan: "Historically poor ships with good men have proved better than good ships with poor men," or words to that effect, and "good

men" are men of high skill, morale, and loyalty, and men well commanded.

KNOWLEDGE AND CHARACTER AS THE FUNDAMENTAL REQUISITES FOR COMMAND

Proceeding with our analysis of the requirements for command and of the duties of a commander-in-chief, we may conclude that the first requirements for such an officer must be:

I. *Knowledge and the technical skill to use it; that is ability.*

II. *Character; which includes the power to use ability.*

Upon a full possession of these two qualities depends the capability of any man for successful command.

KNOWLEDGE AND THE TECHNICAL SKILL TO USE IT; THAT IS ABILITY

ESSENTIALS OF KNOWLEDGE

It will no doubt be admitted without argument that, to be thoroughly successful, a commander-in-chief must have a high degree of knowledge of all the elements of his profession, and that the greater and more varied the extent of his professional knowledge, the better fitted he will be to perform his duties, provided he has the other requisite qualities. While it is well nigh impossible to prepare a list covering completely the field of knowledge over which spread the duties of a commander-in-chief, at the same time we may say that the principal subjects lying within that field are:

a. Policy.
b. Strategy.
c. Tactics.
d. Logistics.
e. Organization.
f. Administration.
g. Instruction and training.
h. International law.
i. Military law.
j. The science of psychology.
k. Creation and maintenance of high morale, loyalty, and military character.
l. Principles of cooperation.

m. Character and temper of nations and peoples.
n. Higher command, including plan making and staff work.
o. How to acquire knowledge.

The extent of the field of knowledge indicated by this list, incomplete as it must necessarily be, indicates in itself the impossibility of securing a perfect commander-in-chief, and shows why the life of a naval officer is all too short for the study of his profession. It is worthy of note that in the above list appears no mention of what are generally referred to as the "technical subjects"; by which is meant such professional and technical matters as the construction of ordnance, as the theory and practice of steam and electrical engineering, etc. The more a commander-in-chief knows of all these subjects the better able will he be to control the forces flowing from the use of material, but in detail they are matters that are habitually in the hands of his subordinates, and so they have not been included in the above list and will not be considered in this thesis.

TECHNICAL SKILL TO USE KNOWLEDGE

The mere possession of knowledge is of little or no value to the working man or to the cause which he serves. No matter how erudite a man may be, he is valueless unless he can transform his knowledge into useful action. Therefore in an officer we must have, not knowledge alone, but as well the knowledge of how to apply knowledge; that is, technical skill. A flag officer may know ever so well the contents of the battle signal book, but unless he can stand on the bridge and handle his command according to the doctrines and by the methods contained in that signal book, he is in reality no flag officer, but only a storehouse of knowledge, really useless to himself and incapable in the office which he attempts to fill; and not only useless, but in a fleet a menace and threat to that fleet and to the country which it serves. Therefore of an officer is demanded not only knowledge, but ability; that is, both knowledge and the technical skill to use it.

KNOWLEDGE OF POLICY, STRATEGY, TACTICS, AND LOGISTICS

Consideration of these four subjects will be omitted from this abbreviated paper, for, while there is much to be said in regard to each of them, they are perhaps better understood than some other phases of this question, and full discussion of them may well be omitted here.

KNOWLEDGE OF ORGANIZATION, ADMINISTRATION, AND INSTRUCTION AND TRAINING

The remarks in the preceding paragraph apply to these subjects also, but in addition it may be well to state in this connection that fundamental organization and administration should be so perfected in time of peace that their operation will continue almost automatically in time of war, thereby relieving those in high command from every-day harassment at such times, and permitting them to concentrate their time and energies upon the immediate demands of war; and that organization and administration are merely means to an end and not ends in themselves; a fact that appears to be sometimes overlooked.

KNOWLEDGE OF INTERNATIONAL LAW

Again we may omit any lengthy discussion, and simply invite attention to the fact that this knowledge should cover international law of the past as well as of to-day; of the force of precedents, of the possible effects of one's actions upon international law, of the power of international law to control one's actions, and of general and special treaties to which our country is a party.

KNOWLEDGE OF MILITARY LAW

This knowledge should include not only the laws, regulations, and rules for the government of the navy, but the broader phases involving the relations of the navy with other branches of our government, and with civil territories and peoples, whether our own or alien.

KNOWLEDGE OF THE PRINCIPLES OF PSYCHOLOGY

GENERAL DEFINITIONS

Before proceeding with the discussion of the principles of psychology it is necessary to give some consideration to the meaning of the word, and we find the following as accepted definitions:

Psychology.—The science of the human mind or soul and its activities and capacities; the science that treats inductively of the phenomena of human consciousness, and of the nature and relation of the subject of them; mental philosophy. (Funk & Wagnall's New Standard Dictionary.)

Psychology.—The science of the mind; systematic knowledge and investigation of the genesis, powers and functions of mind. Under this head there are three subsciences, as follows:

1. ***Individual psychology,*** which treats the developed mind of the individual.

2. *Comparative psychology*, which is the comparative study of different classes of minds, and includes *animal*, *folk*, *race*, and *social psychology*, the the latter including *criminal psychology* and the study of degenerates.

3. *Genetic* or *evolutionary psychology*, which is the study of the mind's development, and includes *child psychology* and the genetic studies of the various departments of comparative psychology.

There are other divisions of psychology, but they are of little importance in classification. (Webster's New International Dictionary.)

Of these two definitions the one given by *Webster* is the most illuminating for the purpose of this thesis, and it will therefore be accepted as the basis for discussion, modified, however, by one addition from the *Standard Dictionary* definition. *Webster* defines the word as being a science applying only to the mind, whereas the *Standard Dictionary* applies it to both mind and soul. The difference is perhaps a somewhat elusive one, but it cannot be denied that many decisions and actions flow from impulse or from some other source than reasoned mental processes. Whatever be the inspiring cause in such cases, whether we consider them as flowing from soul or from the mind, they are equally important in our study of command; it will be important for a commander, in his estimate of individuals or of classes, to be able to judge, not only what decisions and actions may be expected from others in any situation, but also, knowing the individuals or classes concerned and the existing situation, to be able to discern in advance whether such decisions and actions will be based upon reason or upon impulse.

In addition to the general study of the psychology of those with whom he will be brought in contact, as well set forth in *Webster's* statement of the subsciences, a commander-in-chief will have to give consideration to a number of special circumstances and classes with which he, as a naval officer in high command, must necessarily deal. This fact enforces some further elucidation in regard to each of *Webster's* subsciences, and some special application of them to naval conditions.

INDIVIDUAL PSYCHOLOGY

For the purpose of this thesis, *individual psychology* may well stand as defined, provided that we bear in mind that the individuals to whom consideration must be given are specially trained along certain particular lines, and that those lines are widely different from any known in civil life. Therefore the minds of naval officers and men may be expected to show numerous and very considerable

differences from those ordinarily covered by expert civilian students of psychology. It is for this reason that seafaring men as a rule are so little understood by their own countrymen; their habits and mentalities have been so different from those of civilians that they have occupied almost a separate world of their own. And it is only of comparatively late years that the seafaring population has ceased to be very mute in regard to itself; formerly nearly all of its members, even officers of the navy, were not given to writing or even to much study, and it is only within the latter part of the last century that the sailor has appeared in literature to any extent in anything except novels or similar productions. Being thus shut off from the world, little understood and little understanding outside of his own brethren, there grew up in the sailor a mental state very different from and very strange to that of a man whose life is spent ashore and free from naval restrictions. And in addition to the differences resulting from the sea life in itself, existence under those same naval restrictions and discipline produces a still further and a very great effect of a similar nature. While these differences are not to-day so marked as they formerly were, owing to the changed conditions of sea life and to the disappearance of the old-time sailor class as such, nevertheless such differences still exist to a very considerable degree, especially in those who have spent many years in the service, and they must be taken into account in the study of the individual psychology of the members of the naval profession.

COMPARATIVE PSYCHOLOGY

Also, *comparative psychology* with us not only stands as given in the dictionary definition, but must specifically consider the mental processes of the different grades and ranks, as of commissioned officers of command and of subordinate rank, of warrant officers, of chief petty officers, of other petty officers, and of rated and non-rated enlisted men. These are of course classes that do not exist in civil life, even though they may have somewhat equivalent divisions in certain professions on shore. Even where such divisions exist in civil life, the members of each of the several classes are not bound together by mutual interests and close association as they are in the navy. So, while such special classes are not considered in the dictionary, they must be given due consideration in any study of naval psychology. And in addition to the above special

classification we must consider the various corps involved, which include the line, the several staff corps, and the marine corps, each one of which has its own special traditions, habits of thought, interests, etc. Another line of division is based upon actual occupation, as of the deck force for both deck and gunnery purposes, the engineers, the electrical force, and numerous other groups arranged according to the branches of activity in which the individuals concerned are engaged on board ship. Then during the last war we had, as we probably will have in every future war, another most important division the conflicting elements of which must be reconciled; this being based on the different classes of personnel in regard to origin; namely, regulars, temporary officers and men, national naval volunteers, naval reserve force, etc. This last division, that based on origin, in itself furnished an ample field for no mean psychological study.

Not only must we deal with the psychology of personnel operating under the above subdivisions, but we are faced with the fact that many men, especially among the officers, deal, not with the activities of a single subdivision alone, but with more than one; indeed the captain of a ship, and, in a less degree, the executive officer, deal with *all*. And it is a curious fact, but true, that while a man's general characteristics of mind perhaps do not greatly vary under different conditions, nevertheless, when it comes to details, his mental attitude and methods may be very different in regard to one subject from what they are in regard to another, and in such a case the ability of the individual in the different subjects will vary accordingly. Thus a certain individual may be a quick and accurate thinker in regard to gunnery work, let us say, and slow and uncertain in regard to navigation; and similarly with regard to other branches. There are perhaps two possible causes for this, the first being the natural power of any given mind to master certain subjects more readily than others, from which will spring a greater interest in the former subjects and, no doubt, greater and better knowledge in regard to them. The second possible cause is that the exigencies of the service may have impelled the individual into certain studies and activities, which would result in greater knowledge and interest along those particular lines. In this latter case it is quite possible that the particular individual in question can, if opportunity be offered him or forced upon him by the demands of the service, show equal or even greater aptitude in other things. This perhaps

borders on individual psychology, but comes about as a result of the consideration of the numerous classes enumerated above under comparative psychology. However this may all be, the point at issue now is that, at any given moment; the moment at which the commander must deal with the individual in question; a certain mental attitude exists in that individual; an attitude based upon the past and present comparative classification of his mental activities; and it is this mental condition of the moment that it is important to understand, not only in regard to the possible use of the individual at the moment, but also in regard to the possibilities of developing him in other directions.

CRIMINAL PSYCHOLOGY

Under *comparative social psychology* we must consider *criminal psychology,* although fortunately in the naval service we do not have to deal with many real criminals. Still, as we have a special code of laws and regulations governing naval discipline, so we have a corresponding class of offenders against such special laws and regulations. While not criminals under the ordinary definition of the word, these men are offenders, and the study of their mental processes and reactions may be properly considered as a special branch of naval criminal psychology.

GENETIC OR EVOLUTIONARY PSYCHOLOGY

Under *genetic or evolutionary psychology* we have the development of the mind of the individual; perhaps for our purposes an already thoroughly developed mind along certain lines, but awaiting development along others as the individual endeavors to increase his fund of professional knowledge, as every good naval officer must constantly strive to do. The most frequent example of this condition is where an officer who has special knowledge in one particular branch is called upon to develop himself in and perhaps take charge of activities in another branch. Most completely typical of this is the change in mental activities and characteristics that must take place in a successful officer as he advances in rank. Starting as a junior subordinate, he has a certain limited sphere of duty, and he is expected to know everything about such duties in the most minute detail and literally to attend to the details of such duties himself. His principal pre-occupation must be with what he does himself, and only to a much less degree with the activities

of his few immediate subordinates. This condition results in certain habits of thought and methods of mind. As the officer increases in rank, however, the character of his duty broadens; more subjects come within his immediate purview, more subordinates come under his immediate control; and this change in conditions brings with it an enormously increased mass of detail, until it ceases to be possible or advisable for him to attend to all such details himself. He must then begin to effectively control and to rely on his subordinates for details and must begin to center himself less on what he does himself and more on what he causes others to do and directs them in doing. With this must come a corresponding change in his mental processes; a genetic or evolutionary change. Such a step, and a very great one, is that which occurs when an officer passes from subordinate to command position; when, as when becoming for the first time the commanding officer of a ship, he must include in his duties *all* the activities and *very few* of the details, and must rely upon his subordinates for the actual carrying out of nearly all such activities. The best captain is the one who, in carrying on his normal daily duties, *does little himself* but *causes much to be well done by others.* It is from a failure to accomplish this most important psychological change that many an officer who has been an excellent subordinate fails in the performance of the duties of command rank.

CHILD PSYCHOLOGY

Strictly speaking, *child psychology* should not enter into the naval question; and yet, while they are not actually children, nevertheless the extreme youth and in very many cases the great lack of education and mental training on the part of our recruits, do present to us a problem not far different from that presented by a real child. So from this point of view we may perhaps consider that the study of child psychology is one of our problems. In addition to the above condition with which we have to contend; that of youthful recruits with generally immature minds; we have another problem presented by recruits, whatever their age or previous mental training and development, that is in a sense not dissimilar to that presented by the mental development of a child. Such recruit is presumably entirely unfamiliar with the sea and with military discipline; in other words the life into which he is now to be inducted is as unfamiliar to him as is life in general to

the new-born child. His mind is absolutely devoid of all the knowledge and habits that we require it to possess in order that it may be useful to us. Therefore we will surely be not amiss if we consider that, while we are not dealing with child psychology literally speaking, nevertheless we are dealing with a mind that, regardless of the age of the individual, is the mind of a child so far as our particular purpose is concerned. The mind in question may be well educated, well trained, and well developed generally, and so be especially fertile for rapid special development in our particular branch; but otherwise, for our special purpose, it has little advantage over that of a child. Hence it is not far from the truth to consider that the principles that should underlie our training system for recruits of all ages should be similar to those of child psychology, modified as may be necessary to meet the condition of an older body and of a mind developed to a greater extent than that of a child in regard to things other than those which we now wish to teach.

SUBJECTS FOR PSYCHOLOGICAL STUDY

Having presented some general statements in regard to psychology, and having enumerated some special classes to which a naval officer should give psychological study, it becomes necessary to set forth some arguments as to why such study should be given and as to what results should follow it. In stating that one item of knowledge that should be possessed by a commander-in-chief is that which relates to the principles of psychology, it may be said that his studies in this branch should refer to our own and to foreign peoples, governments, and officials, both civil and military; and especially so far as concerns:

1. Seniors in command.
2. Equals in command with whom he may be called upon to cooperate, whether they be naval, military, or civilian; whether of our own or of foreign nations; that is, associates in command.
3. Subordinates.
4. Himself.
5. Enemy high officials and naval and military commanders against whom he may be called upon to operate.

PSYCHOLOGICAL STUDY OF SENIORS AND ASSOCIATES

In regard to this phase of the matter it may be said that the purpose in view in regard to such friendly elements is to bring

about mutual understanding and coordinated action. To do this each must understand the other, and in conference all must finally reach a common conviction in regard to the subjects at issue. In one form or another, such as are interested must meet, each must present his views and beliefs, and from this interchange must come a final decision; accepted and believed in by all; from which can flow coordinated action. It is evident that to accomplish this each must know the mind of the others. And although the character of the situation changes according to the subjects of the conference and the character of the participants in it, as well as with the manner of the conference, it may justly be claimed as generally true that the main object of such conference is for each member to present correct and strong views, to convince others that such views are correct, to display his mind for the benefit of the others; and, on the other side, to become convinced by argument when he holds any mistaken views, to have any such views corrected by argument and the presentation of additional information, and to benefit himself by the mental displays of others. Only by some such process can coordination and cooperation be successfully accomplished. Now a commander-in-chief is presumably a man properly qualified to command, and his beliefs and conclusions are entitled to great weight when he sits in high council with those by whom he is commanded and those with whom he must act in conjunction. Therefore it is most important that the commander-in-chief shall at such times be able to present his views in such a way as to command respect and to secure their adoption unless some wiser senior or associate can either show that such views are faulty or else propose something better. A man cannot do this unless he knows the psychology of such seniors and associates and understands how best to approach each one of them; one particular argument or line of reasoning will convince one type of mind and have little effect upon another.

PSYCHOLOGICAL STUDY OF SUBORDINATES

So much having been said in regard to the psychology of seniors and associates, we may now speak of the subject as referring to subordinates. Here the principles as laid down above still apply, but somewhat differently. It is true that a commander-in-chief, or any other officer, if he is to secure good results, must in some manner convince his subordinates of his wisdom and sound judg-

ment, so that they may with confidence support and obey him. This means the creation and maintenance of high morale and loyalty within his command, and the first step in accomplishing this is to convince his subordinates that he possesses in a high degree the qualities requisite for high command; in the words of the Articles of War: "to show in himself a good example of virtue, honor, patriotism, and subordination," wherein the writer believes that the law attempts to summarize the qualities that should be possessed by every officer in high command. Now the convincing of one's subordinates depends upon personal contact and argument, so far as a commander-in-chief is himself concerned, with only a very limited number of individuals; he deals personally with a few force, squadron, and division commanders, his own staff, etc., and the only way in which he reaches his lesser subordinates is through those others, and by his general attitude and measures. Now if a commander-in-chief can in the first place create a feeling of confidence in himself on the part of his subordinates, which means morale and loyalty, he has thereby acquired over them a large measure of that influence which he seeks to obtain. Having their admiration and respect, they are disposed to accept his measures more or less without question; which means that, having once convinced them that he is worthy of command, it is as a rule not necessary for him to convince in regard to individual measures. And this favorable situation goes further back than this, for, in the case of an officer who is not unfavorably known to the service at large, the very fact that he has been ordered as commander-in-chief arouses in his subordinates a predisposition to assume that he is worthy to hold the office. These two facts make the situation most advantageous for him who has the desire, skill, and tact to make use of the favorable elements to the utmost. The difference between this case and that in which an officer deals with seniors and associates is manifest, and is that, in dealing with those others it is necessary to convince by argument and sound presentation of each individual case; only in rare instances can one hope to carry such others with him by the strength of their favorable feeling for him; whereas, with his subordinates, when once he has instilled into them the proper feelings of loyalty and respect and the desired high morale, their feeling for him will cause them to accept as a matter of course and loyally to support his measures, and will make them desirous, not only of understanding,

but of foreseeing and meeting his wishes even before they are expressed.

PSYCHOLOGICAL STUDY OF SELF

It is evident from what has already been said that, in order to know others, a man must first know himself; that is, his psychological study must begin with himself. Unfortunately this particular branch of psychology, which is one of the most important if not the most important, is the one that is most apt to be neglected, especially by the young. Unless the habit of self-inspection and self-study begins in youth and continues through life, it is little apt to be taken up in later years. And youth is little given to introspection; is too apt to give little thought to its own actions. If, of two captains, one has an efficient and happy ship and the other the reverse, it is generally the case that their subordinates and those others who are aware of the conditions, will accept the result as being caused by certain qualities natively inherent in the two men; they will think that one captain was born with the qualities requisite to produce the good results and that the other was born without them; that the results actually achieved were inevitable and consequent upon conditions that came into existence when the two men were born. Now if those two men, during their preceding years, made no psychological study of themselves, this point of view is doubtless correct. If, however, any man makes a proper study of himself, it may well be that he may remedy defects existing naturally in himself and thereby achieve success instead of failure.

PSYCHOLOGICAL STUDY OF YOUNGER OFFICERS

In his dealings with his subordinates, the writer has found that one of the greatest difficulties with younger officers and with enlisted men is to get them to really think, and his first effort has always been to attempt to stir them to mental action, and to guide such action in appropriate directions. So far as the men are concerned, the usual newspaper published on board most large ships furnished a good medium for reaching their minds, and much can be done by properly worded notices and orders, and by training the officers to stir the men to mental activity. For the officers, the writer has made continuous efforts in the same direction, through close personal association, by constant carefully considered conver-

sation with officers on the bridge and elsewhere, and by the preparation of treatises, etc., on various subjects which he has endeavored to get into their hands in such shape and by such methods as will arouse their interest and avoid repelling them by the appearance of preaching.

PSYCHOLOGICAL STUDY OF ENEMY OFFICIALS

A most important phase of the question is the psychology of those foreign officials against whom a commander-in-chief is apt to find himself opposed in time of war, which would of course mean primarily the commander-in-chief and other high officers of the enemy's navy. To know their habits of thought and to understand their probable reasoning and conclusions in any given situation is manifestly one of the greatest assets that a commander-in-chief can possess. Therefore information as to the character of such officials in all foreign navies should be eagerly sought at all times in preparation for possible war, and, as well, should be studied the doctrines and habits of thought that generally find favor in each such navy. It is perhaps needless to add that here is a place where great caution is necessary if we would avoid error, and perhaps fatal error. It is hard enough to reach sound psychological conclusions in regard to our own people, even our own fellow officers, and when we come to study even the civilian mind of our own countrymen we find greatly increased difficulty in being sure of our conclusions. And this difficulty is greatly enhanced when we attempt psychological research among alien personalities, even of related races; and when the race under investigation is not only alien but a member of one of the great divisions of the human race differing widely ethnologically from our own, then we must indeed accept our conclusions only with the greatest diffidence, and must suspect that any conclusion that we may reach is very apt to be erroneous.

THE APPLICATION OF THE PRINCIPLES OF PSYCHOLOGY AND THE RESULTS SOUGHT BY THE APPLICATION OF THOSE PRINCIPLES

From what has been said it will be perceived at once that, in the study of psychology, we are seeking a means to an end. That end is two-fold in its nature; on the one hand it is the understanding

of the mental conditions and mental processes of those with whom we have to deal in order that we may either bend their thoughts and purposes into channels along which we think they should flow; or else, on the other hand, it is to understand them and, after we have so far as practicable induced them to accept our point of view, to otherwise accommodate our own mental activities to theirs, while at the same time building up in such associates a desirable frame of mind and will. Under this last head comes the creation of morale. This all means that, by a given means; the application of the principles of psychology; we desire to attain a certain end; the acceptance of sound purposes and the creation of high morale. We have discussed psychology at some length and in so doing have familiarized ourselves with the *means,* and in subsequent discussion we will consider the practical application of this means to attain the desired *end.* Before proceeding to do this, however, one further remark seems applicable, and that is that in all dealings with personnel, of whatsoever nature, psychology enters as a controlling factor. The giving of a simple order; even the tone of voice in which it is given; has a psychological effect upon the hearer—an effect that may be of the first importance. And this is equally true of personal actions; the manner and bearing of an officer in an emergency are important to the utmost limit because of their psychological effect upon those around him. Therefore, every thought, every word, and every action should, consciously or unconsciously, be in accordance with correct psychological principles if we would attain a maximum of success in our relations with others, be they seniors, associates, or subordinates.

CLASSES OF MEN AND MINDS

It is difficult to reduce men and their minds to any simple classification, and any such effort must be only moderately successful and full of flaws, but nevertheless it will be well to briefly touch here upon this point. In general, and without special discussion, we may say that we have, or may have:

1. *Geniuses.*—Such are rare; they are an abnormality. When the abnormality works beneficially the individual in question is hailed as a genius; when it works in the other direction we put him in the mad house. "Genius is akin to madness."

2. *Men who just fail of being geniuses,* but who in attainments and performance stand very high; the class bordering on genius.

In this class there may be men who fail of genius simply because opportunity does not knock at their doors.

3. *Men well above the average in attainments and performance.* These are they upon whom must fall our main burden.

4. *Men average or thereabouts,* upon whom we must depend for the performance of the greater part of the subordinate duties, for such men compose the great majority in any organization. It is hopeless to expect good results from them in any but subordinate positions, and the psychological problem becomes to get the best out of them that they are capable of producing, meanwhile supplying them with the necessary guidance and inspiration.

5. *Men somewhat below average, but not enough so to keep them from being useful in a limited sense.* Such men must be used for what it is possible to get out of them; the problem is to know what they can do, to get them to do it, and to avoid letting them get into positions where more is demanded of them than they are capable of producing.

6. *Men so far below the naval average that they can be of little or no use—failures.* Fortunately we have not to deal with any great number of these. The problem is first to recognize them, and then to get rid of them, for they are not only useless, but a menace—there is always danger that one of them will inadvertently be placed in some position where something of importance may directly or indirectly devolve upon him, and failure will then result.

From this statement our psychological problem of organization becomes apparent. It is to recognize and select from among our personnel, the men who constitute each of the above classes, and to fit each one into the organization in such a way that his faculties and powers will be given the fullest possible play, without in any case placing any man in a position such that the load thrown upon him will exceed his ability and power to carry.

QUALITIES OF MIND NECESSARY FOR LEADERSHIP

From a psychological point of view it is readily deduced from what has already been said that, among the leading qualities of mind necessary for leadership, considered as qualities of mind purely and not as qualities of character, are:

Receptivity—the power of receiving and assimilating.

Quickness—the power of receiving, assimilating, and drawing conclusions rapidly.

Accuracy—the power of receiving, assimilating, and drawing conclusions correctly.

Judgment—the power to discriminate correctly and wisely; to correctly differentiate between the practical and the impracticable.

Stability—firmness, constancy, steadiness, singleness and tenacity of purpose, persistence, pertinacity, patience.

Courage—spirit, confidence, self-reliance, resolution.

Imagination—originality, inventiveness, inspiration.

Initiative—power to conceive and to execute without prompting from without.

Skill and ability to inspire other minds.

It is difficult to prepare such a list as the above and in doing so to differentiate between qualities of mind and of character; mind and character are inextricably interwoven. Nor can any such list be complete. As given above, however, it may be accepted as a partial list indicating the fundamental characteristics of mind upon which character, especially military character, and command efficiency must rest.

(TO BE CONTINUED)

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

COMMUNICATIONS AFLOAT

By LIEUT. COMMANDER MAHLON S. TISDALE, U. S. Navy

NOTE.—In early May, 1921, a high ranking officer asked me to write him a letter commenting on communications, with special reference to radio, in order that he might incorporate such of my views as he believed sound into the communication organization of the unit under his command. I was at that time a staff communication officer (radio). In an attempt to emphasize the effect of good communications on the efficiency of gunnery—the backbone of any naval offense—and upon our general readiness for war, the letter was written as requested. The following article is a revision of that letter and is published in the hope that some good may result, in that—if in no greater way—it may draw added service thought toward communications.

Why is it almost a service custom to give gunnery precedence in personnel and in schedules? Because gunnery exercises are held in competition. A good gunnery ship is known as a good ship. Her scores are published to the service. She is a success. But what of the rest of the ship? It is probable that a good gunnery ship is a good ship in every way, but not necessarily so. A good ship at S. R. B. P. might be a failure in battle through previous neglect of other equally important coordinate branches in the interest of improving gunnery.

Of what avail is good gunnery, or good engineering, or good communications unless all three are good? These three important branches of the service are interdependent. Guns are of small value unless the engines can place them where they can best be used. Engines are valueless for fighting a successful engagement unless the captain knows where to order his engines to take his guns.

Can our captains now *depend* upon knowing where the enemy will be? Can our excellent guns render a maximum value? What captain will put his best turret officer in charge of communications? How many will put their worst? How many will spare any turret

officer for communications? Yet, one turret officer controls one turret. One communication officer may bring success or failure to all turrets.

Considering the comparative infancy of communications they are good. But we can make them better. Recognition of their importance by the service in general will make them so.

As the human brain is to the body, so is the communication service to the navy. How does one write? The body assumes the proper position. The coordination of brain, hand and eye then causes the written word to appear. If a hand or an eye be gone the body still can succeed. If the brain be gone, all is gone. The communication service is the brain of the ship. The guns are the hands, the engines the feet.

It is doctrine that we must have information. The service admits that communications are vital in war. There is much talk about the lack of scout and battle cruiser types. The fleets must have eyes. But the scouts must also be able to report what they see.

Recently a ship's radio officer was questioned regarding the reason for having an ensign detailed as communication officer on the ship to which he was attached. His answer was that the ship had only five lieutenants and that the others (the officer being questioned was himself a lieutenant (T) (G)) were all assigned to the engine room or the battery. How many young ensigns were senior turret officers, do you suppose? Which duty should be the most important? Aside from the fact that the ensign can ill spare protracted relief from watch standing experience the service also suffers. One turret is not of more importance than the ship. Incidentally, the Department recognizes this in that it is not permissible to detail an ensign as communication officer of the ship. Gunnery needs more experienced personnel numerically, but one officer of reasonable experience should be assigned to communications on each battleship.

It is not uncommon for some of the battleships to have ensigns for communication officers; and for others to have a more experienced officer assigned to communications in addition to other duties—a turret perhaps.

It is undesirable that the communication officer should be picked after the other departments have had their choice of the available material. It is hoped that the day will come when communications

will be recognized and will be established into an independent department, with a regular departmental head on each ship. If it is as important as its sister branches it should have equal rank with them in the assignment of officers.

The communication officer need not have had previous experience as such. This is, of course, desirable but not necessary. His major function is administrative. He must keep the wheels moving. It is his function to see that his subordinates—his technical assistants—deliver the results. He is, of course, in charge of all forms of communications with the necessary technical assistants in each branch.

Of these assistants the most difficult to train is the radio officer. The signal officer need not be the best signalman on the ship but he must be able to take executive charge of signalling on the bridge at any and all times. This can be learned with a reasonable application. The radio officer cannot be so easily obtained; it must be decided just what will be the limit of his technical knowledge. What, at least, will be the required lower limit. Radio is too much of a science for an officer to master it as a side issue of his line duties. Failing strict specialization the lack of a complete technical knowledge of radio among line officers must be admitted. Radio engineering is a complicated study and cannot be less easily learned than any other science. No officer of the line can afford to give sufficient time to master it. It is a question of years. Such few officers of the line as are taken into the engineering corps with a radio specialty will have to be depended upon, together with the civilian radio engineers, for the design work and for getting out the instructions about the care and use of the material provided. An occasional radio gunner will develop ability along similar lines but this will be the exception rather than the rule.

The gunners can be depended upon for the necessary knowledge to carry out the instructions for the care and operation of the set and for effecting repairs.

The average radio officer—under present conditions of little specialization—cannot be expected to be a material expert. He can be expected to be thoroughly competent to act as a directive head for the gunner and his men. He must be skilled in traffic handling; must make a study of the field in which radio can be used; must perfect the details of the ship's radio organization, must conduct a school for operators as well as for the strikers, covering the

elements of electricity as well as buzzer instruction; must demand that the gunner and his men get results. He must have a good general knowledge of radio but not necessarily a complete detailed knowledge. The greater his knowledge of radio material the better—providing that he is a line officer—but this is not vital for we cannot expect him to have it. It is better to look the situation in the face than to try to hold him for something which he has no means of knowing.

The new communication regulations when finally issued will no doubt state in detail the duties of a radio officer. This is important. The midshipmen at the Naval Academy are now using a pamphlet covering these duties. This would be a help to the service at large were it made a part of all ships' libraries. It is hard for a young ensign to be called up and told "you are radio officer, go to it." He usually spends much of his time playing with a buzzer because he does not know what else to do to qualify himself for these strange duties. Unless there is a former radio officer on the ship he does not know where to turn to find out what he is supposed to do. This lack of knowledge of his duties is not confined to the radio officer. Many of the older officers do not know what to expect of him for, due to the comparative infancy of radio, many of them do not know what a radio officer is supposed to do other than to get the message through. Of course this is the ultimate mission of radio but there are many preliminary steps in the organization of an efficient force for getting the message through 100 per cent of the time. The opinion is not infrequent that the radio officer is available for odd jobs because "he doesn't do anything anyhow." So few of the older officers have been radio officers themselves that many have a perfectly plausible lack of knowledge of the dimensions of a radio officer's duties. Not what he must do but what he should do. The outstanding radio ship is almost always one which has a captain who is "behind" his radio officer.

It is to be hoped that the new communication regulations will cover in detail the duties of each of the various officers in the communication department in addition to the radio officer. In this way an officer can break in in a much shorter time than at present obtains. The navy regulations cover the duties of the navigator and the doctor and the supply officer, etc., but are neglectful of the communication branch. This can be easily rectified in the communication regulations. (Unofficial correspondence with the De-

partment subsequent to the writing of this article has brought out the fact that the Department intends to cover the general duties, but that it is impracticable to cover the duties in detail, in view of possible omissions. This general outline will doubtless be entirely satisfactory from the point of view of the communication personnel afloat.)

The radio gunner should be an expert radio repair man and will, of course, be an operator. The radio officer should be detailed for the duty for not less than one year, and if he is informed in advance that he is to be assigned to the duty he can easily learn to operate before he takes over the job. With these two officer operators on each capital ship it will be a simple matter to arrange officer discrepancy watches. That is the major reason why officers should be operators. It should be a rare case when a gunner is ordered as radio officer of a ship. They, through no fault of their own, have been denied the training given a line officer and hence cannot be expected to be as well qualified for administrative work as a trained line officer. Then, too, they are specialists. It is unfortunate but true that specialization in any branch sometimes tends toward a narrowness of vision. The trained executive, not a specialist, is much more likely to see the ship as a whole and determine the particular mission which radio and communications must fulfill in relation to the other branches.

For a staff afloat it is believed that a slight modification should be effected in the existing organization. For a fleet staff it is believed better for the communication officer to have no other duties. This would not be necessary for the subordinate staffs of the fleet inasmuch as the fleet staff is responsible for the greater part of the organization work. When the fleet is together, as is usually the case, the subordinate staffs are more in the nature of executives for the fleet staff, in carrying out policies, schedules, and drills. Under the present organization it has been the custom to consider all forms of communication as communications, this includes mail. The flag secretary is ex officio staff communication officer. This plan was worked out by one of the ablest communication men the Atlantic fleet has ever had; but it is doubtful if that same officer were now in his old position whether or not he, too, would not agree that the enormous increase in traffic since his incumbency would not warrant a separation of dispatches from mail. There is no question that a letter is a "communication."

Yet it lacks the one factor which tends so much to make or break the efficiency of dispatch communications—speed. For efficient communications, speed is vital. The flag secretary is usually the one officer on the staff most confined by detail work. He has less spare time than any of the other officers, excepting, of course, the chief of staff. In addition to the mass of confining correspondence which must be handled he is given the additional duty of being called communication officer. As a result it is quite common for the radio officer to do much of the planning for general communications. Or if the radio officer does not usurp this function of the communication officer it is sometimes not done at all. A flag secretary has no time for planning or organizing beyond his own job, or, if he has, or if he takes the time it is unfair to him. The present division of work of the staff is a little out of balance. The radio officer should not be communication officer. He will quite naturally favor his own branch to the possible detriment of the others.

The best solution of the problem would call for a fleet communication officer with no duty, except in that branch. Some staff assignments are now allowed for duties much less important than communications. The fleet communication officer should be an experienced communication man. He can be drawn from the subordinate staffs after a period of instruction there or he can be drawn from the shore communication service. He should have sufficient rank to be senior to the force, division and ship radio officers, flag lieutenants and communication officers. An admiral has no time to go into the intricacies of radio. He is apt to judge the efficiency of his communication personnel solely by results. As a result much of the technical work is done directly between the unit technicists. For this reason it is important that the various technicists scale down the line of seniority according to the seniority of their admirals. It is not the best organization for a force radio officer, or communication officer, or flag lieutenant to be senior to his opposite number on the fleet staff. So fine a distinction might be impracticable but this scaling should obtain for communication officers at least. The fleet staff make many of their decisions after conference with the subordinate unit staffs. It is an awkward situation and does not make for efficiency. The junior man carries the responsibility for the decision and this may mean that he will decide against the advice of the more experienced officer. Result?

The senior officer will offer no more advice from his greater fund of experience and his services will be partially wasted. This situation is no more pleasant for the junior than for the senior. He dislikes going against the advice of the senior yet he is carrying the responsibility and must use his own judgment.

Due to the increase in size of the fleets there has gradually come to be a need for a fleet tactical officer. The old flag lieutenant was usually only moderately senior. His duties as an aid are not of a type to make senior officers want the combined jobs. The duty has slowly divided itself until now it is quite customary for the fleet tactics to be handled by one officer while the aid's duties are handled by a much younger officer. The fleet communication officer should be an officer of experience and he could if specially selected well handle the duties of fleet tactical officer as well. The flag lieutenant could handle the duties of aid and fleet signal officer, without difficulty and his moderate rank would fit him for this. Subordinate flag lieutenants should be junior to the fleet communication officer and if so not necessarily junior to the fleet flag lieutenant. The greater number of difficulties which must be adjusted will be questions of interpretation of the standing orders or of the signal book and these can be straightened out by the communication officers of the units.

It is believed that the flag secretary should be subordinated to the fleet communication officer for sending and receiving mail as this is one form of communications just as it always has been.

The question of the authority of staff communication personnel on a flagship should be definitely decided. The preliminary issues of a portion of the new regulations say that the staff radio officer shall have charge of the radio installation on the flagship. If this means that there shall be no ship's radio officer, it is not believed that this is a good organization. There should be a complete ship's organization upon which the staff organization can be superimposed. It is not infrequent for a staff to change flagships. If they have had entire charge of the bridge and the radio what sort of an organization will remain after the transfer? Will this ship be as efficient for war as her sister ships that have not had the staff removed? There is another side to this same question. The staff are, through their admiral, responsible for the bridge and radio of all the ships of the unit. It is only human nature to want the flagship to be better than the others if they are personally responsible for the

efficiency of the flagship. This will warp the point of view of the staff and will increase dissension with the consequent reduction in efficiency of the remainder of the unit. The staff technicist can have the necessary authority without having direct charge of the installation. It is immaterial whether the radio officer of a flagship tells a supervisor verbally that he can or cannot clear a message or whether he does this by radio or bridge. If the radio officer sends a " Q " to some ship other than the flag is not this similar to telling the operator on the flagship verbally to " wait "? The staff personnel is of course under the discipline of the captain but they are not under his command for work. The arrangement whereby the staff assumes direct charge of the radio or bridge is unfair to the captain, the ship, the remainder of the unit, and the service. This requirement is mentioned in the Naval Regulations 786 (7). The Communication Regulations, at present, do not cover it. The commander-in-chief, Atlantic fleet, in an order once issued stated as follows:

> *Flagships. On board flagships* the ship's communication officer is to coordinate with and be subordinate to the flag officer's organization in regard to despatch work. He must insure, however, that the ship's communication organization remains intact and capable of carrying on, in the event of transfer of the flag. The flag officer's organization should be considered as superposed upon that of the ship.

Another thing which would be of immense help to the inexperienced personnel breaking into the Communication Department, especially radio, would be a bureau pamphlet descriptive of the standard radio installation, with complete instructions for the care and operation of the set. At present new personnel is in a quandary unless there is an experienced chief or gunner available for explaining the installation. Now that the battleship installation is standard it should be practicable to get out a pamphlet of this nature. It would be valuable to the service. I have seen radio personnel, in an attempt to " make the set work " proceed on the trial and error basis. This was done because, apparently, they lacked complete knowledge of the installation and the various reasons why it is connected as it is. Blue prints are never as satisfactory as a manual containing more or less description, especially for use by inexperienced personnel.

Coding drill should be encouraged in the fleet. Not that coding or decoding should be a daily occurrence but at least one drill each

week should be continued. Nothing will bring efficiency in the use of the code books except familiarity and only experience and practice will bring familiarity. This is especially applicable to our present signal books. Familiarity with the contents and the manner in which they are made up will do much to increase the speed of the officers using them. Familiarity with the method of making up the books is as essential for officers writing messages as for those actually coding and decoding.

Only officers of recognized standing should have access to the code books in peace time.

It would be better if the radio schools ashore could turn out all of the operators. It is doubtful if a system whereby certain recruits are allowed to go to the school is the best. The requirements for maintaining a sufficient number of radio strikers—certainly one for each vacancy in complement of radiomen—should be rigidly adhered to. The strikers should be hand picked for their previous schooling. No man should be allowed to join the radio force who is not educationally potential material for an operator. There are some strikers who have insufficient knowledge to ever become more than third-class operators—if that. This is unfair to the service and is unfair to the man. He might be making good in some branch where schooling is not a requirement and the service might in his place be training a potential chief radioman or gunner. If the strikers were carefully selected—and few branches demand as much elementary education as radio—then the apt ones sent to school ashore there would be no occasion for the usually unsatisfactory radio school on the ship. Something is likely to interfere. There is bag inspection or early liberty, or watches or general drills. All in all the radio schools on board ship are not efficient. The inapt strikers should be dropped from the radio force as soon as they have been shown to be such. No use carrying them as "dead heads." The service, especially the operators, pays too much attention to operating ability. Traffic can be handled very efficiently at not over 25 words a minute. Yet every operator has an ambition to reach 30 words. The last 5 words come slowly. It means hours of practice over a considerable period of time. They could be better spending the time studying the elements of radio. A first-class radioman once confessed to me that he knew "nothing about the set." He could operate and there he stopped. That is not efficiency. There are many smaller ships having no chiefs. A first-

class man should be able to care for a set and make routine repairs. The 30 words are desirable but not at the expense of elementary practical work. In the absence of the system of schooling mentioned above it is necessary that the school be continued on the ship. School in the afternoon is subject to continual interference. School should be held in the morning, or even better require a certain number of hours per day (2 to 3 hours in part) and let the ships vary their time of holding school as necessary to get in the required number of hours. It is allowable now to send strikers to the Great Lakes for Schooling. This should be carried out. The two-year enlistment has played havoc with this scheme. The Great Lakes School (or the Bureau of Navigation) would help by getting out an outline of work for ships schools and sending it out to the service as an outline of work to be followed in schools in the Navy Yards during overhaul. This school could be in the nature of post graduate work for the Great Lakes graduates. All men should be graduates of the Great Lakes schools if practicable. The navy yard school could carry one section for strikers qualifying for the Great Lakes course. Officers should conduct the school. If there is a practical section run by a Gunner or a chief—and there should be—still a radio officer should be there in charge of the instruction.

In radio drills instruction ought not be subordinated to competition. Procedure drills are not for the purpose of training strikers to read radio messages. But they should be for the purpose of increasing the knowledge of the already qualified operators and strikers. No man will be placed on watch of course until he is competent to send and receive. But this does not necessarily mean that he is a thoroughly qualified traffic man. It should be so, but that is impracticable under the present method of obtaining operators. Our mission to be furthered by the drills is to take an operator already qualified to send and receive and by the drill to make him a thoroughly qualified traffic man. This will not be done under a system where competition is the major feature. Radio from its nature is, for drill purposes, a one or two man proposition. *One* good radio operator can stand the ship first in competition thus gaining for the ship a reputation and a credit to which it may not be entitled by the actual average radio excellence of the ship. And no one man can receive all the messages for war. We are training for war not for drill. There should be a scheme whereby the man actually on watch receives the drill messages and no expert may

listen in with the operators to catch the missed parts. Strikers should listen in for experience. The man actually receiving the message should be a better operator than any of the other listening in on his set, except of course the officers. A recapitulation should be made at the end of the month and ships should be rated according to the number of errors and the number of operators taking the drill. For example, a ship having 15 operators should not be rated first unless each of these men had received at least one drill. A simple way to work it out would be to figure the standing as is customary based simply on errors and then reduce this standing by applying a penalty for each operator who had not taken at least one message. The ship which shows the best average number of messages per operator should get a bonus. In this way you can get away from the ship which puts her leading men on for drill regardless of the efficiency of the remainder of her radio force. The average operator is lacking in knowledge of the new procedure and he will gain this knowledge only through drill of the right kind, or through long experience on watch.

When the fleet is at sea radio drills in conjunction with flag hoist as provided in radio instructions should be held. It is customary for the flags to be hoisted well ahead of the radio. As a result it is not long before the radio gang begins to lose interest. True, in battle the flags will be up first *if they can be seen* but there may be times when dependence will have to be placed on the radio. For that reason it would be a good plan, sometimes, to send the radio messages in advance and answer them with flags before executing. This is done—but infrequently. In this way the morale of the radio operators will be kept up

Ships not now so fitted but having loud blowers should have a hood or a small head booth built over the voice tube outlet (from flag plot) in main radio. At present the noise of the blowers makes communication from flag plot difficult. The only I. C. telephone jack in main radio on some ships is a JX. There is no JX in flag plot. There is a JX in auxiliary radio. Either a JX should be put in flag plot (a take off from the one on the bridge) or some separate circuit should be put in. If JX is to be used for communications the other departments ought to get off of it. If a division were to maneuver by radio the Admiral commanding could save a great deal of time by being in telephonic communication with the sending operator. There is a buzzer system installed from flag plot to the

various radio rooms. Their use is feasible but is slow compared to an efficient telephone system. The buzzers would do well for a secondary. Buzzers on loud speakers sound all over the bridge and the radio officer or an operator reads them wherever he may be on the bridge. An objection to this is that the additional noise is unnecessary for efficiency. Few captains and fewer admirals like noise on the bridge. With a telephone for primary and with the voice tube and the buzzer for secondary, communication should last as long as the rest of the ship does. The pneumatic tubes are necessary for confirmations and for handling long messages. It is of course preferable to send all messages through the tube in writing if time permits.

Talkers should be especially selected on all ships and trained in procedure so that when a conventional signal comes over the tube they will know its meaning. Communication yeomen or radio personnel should be used for this purpose.

In port it is thought desirable to keep additional watches on depending on the number of operators available. The only watch usually ordered is on Auxiliary on ships so equipped. This gives an operator too few watches to keep him in training. With a possible reduction in fuel allowances for 1921-22 this lack will be enhanced.

The radio gang should not get watch-standers liberty (1.00 p. m.) unless they are standing not more than a watch in five. The plan of keeping one watch on and letting the rest go ashore as watch standers is faulty. There is plenty for them to learn about radio. They are lacking, as a force, in the knowledge of radio material. They can operate, usually, but are frequently deficient in material knowledge.

In my experience the average radio force needs discipline. Being exempt from ordinary work on deck and from discipline teaching drills they on some ships are allowed to slack down. If this condition obtains it would be well to require some form of infantry for them daily. Operators should not smoke on watch; ventilation of the lower deck radio rooms is none too good normally.

When the fleet returned from Panama the Pacific fleet radio officer got out a suggestion concerning the method of using radio in harbor in order that the men would not go stale. He in accordance with the gist of his suggestion wrote to the Pacific coast communication superintendent and obtained permission to use the radio

sets in harbor under certain restrictions. For cause it has never been placed in effect. Some such plan should be adopted if the men are to actually learn radio. One scheme, is to have the regular guard ship act as radio guard ship for *auxiliary* radio, and for main spark. The first relief guard ship acts as arc sending ship and the second relief as arc receiving ship. This would have to be worked out according to the shore station schedules for the locality in which the fleet is based. If a part of the ships are out at sea in the vicinity of the harbor the guard schedules remain unchanged. A few miles makes no difference in their ability to handle the traffic. If they are out of range the guard ships fleet up according to their regular sequence on the list (Fleet Regs.) upon order from S. O. P. This system is automatic and is easy to remember.

It would be better that neither the fleet radio officer nor the force radio officer should have to worry about anything but his own organization and plans. A staff radio officer can be a very busy man if he has a chance. He should have no additional duties.

The fleet radio officer should make up a definite set of requirements for rating of operators. It might be necessary to have these approved by the Bureau of Navigation. A fleet examining board should examine all candidates unless ships are on detached duty, for protracted periods. Under the present system the examining board may know less radio than the candidate. As a result incompetent men are, sometimes, rated to the detriment of communications. Some *first-class* men cannot do anything in radio except operate. This is manifestly wrong.

Some check up system on the speed of handling traffic (as used on the *Wyoming*) should be required. The times between ships are good—perhaps satisfactory—but the time lost within the ships is often excessive. The slowness of communications is not so much in actual transmission as in the internal routing and red tape on the ship. Too much red tape and not enough speed.

The interest among the older officers in communications is on the increase. If they, at the helm of the service, will believe in the necessity for an added efficiency in communications it will come. And with it will come better gunnery, better navigation; in short, a better navy.

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OUR RICH BUT NEGLECTED OLD NAVAL HISTORICAL LITERATURE

By Louis N. Feipel

A comprehensive history of the United States Navy still remains to be written. The so-called "histories" of the navy are for the most part confined to accounts of the various wars in which we have engaged at sea, while the activities of the navy during the long intervals separating those wars—although equally interesting and important in their own way—have been recorded therein only cursorily and fragmentarily. Fortunately, however, the printed material available for a study of these peace intervals is quite adequate for the purpose, and the only drawback to its perusal and manipulation would seem to be the non-existence of a complete collection in any one place, together with the want of a systematic guide thereto.

In the belief, therefore, that this great mass of naval historical literature should be marshalled in logical order and properly codified, the present writer has busied himself for several years past in getting on the track of every publication bearing upon the subject, and examining it to determine its value as a naval historical source. Thus far, his efforts have been directed mainly to the period extending from the close of the war with Algiers, in 1815, to the beginning of the Civil War; and the accumulation of bibliographical information which has resulted has amply repaid the compiler's efforts.

The period in question is commonly referred to as the era of the old navy, in contradistinction to the period of the new navy which came some time after the Civil War. But considered from the point of view of efficiency and service, it deserves to be styled the golden age of the United States Navy. For those were the years when our naval architecture was second to none, when our maritime

enterprise astonished the rest of the world, when our warships circumnavigated the globe and made cruises of from three to five years' duration, when our naval officers performed various difficult diplomatic services, opened up and extended American commerce in the Orient, suppressed piracy on the high seas and otherwise punished depredations on our commerce, assisted in suppressing the African slave trade, conducted numerous surveying and exploring expeditions in various regions of the globe, made many notable contributions to scientific knowledge, relieved suffering humanity on various occasions, and was always prepared to protect American interests and assert American rights wherever necessary. In consequence of all this, American literature was vastly enriched by the publication of sundry accounts of the events occurring in connection with these services—a literature rich in its scope and variety, and numbering upwards of 300 separate items.

Unfortunately, however, no critical account of this naval literature has as yet been published. Neither is there gathered together in one place anything like a complete collection of the source-material in question. The collections of the United States Naval Academy Library, the Navy Department Library, the Library of Congress, the New York Public Library, the Barnes Memorial Library (New York), and the private library of Mr. Charles T. Harbeck (New York), probably approach somewhat near to completeness, but not one of them can produce all of the items included in the present writer's manuscript bibliography. Several items, in fact, are not contained in any of the above collections; and others, again, are so rare as to be found in only one or two places.

As was said above, the number of items in a complete collection of the naval literature covering the period under consideration would be between 300 and 400. Of these, more than 100 bear upon the famous Wilkes Exploring Expedition alone. No other single episode throughout the entire peace existence of the navy can make anything like such a literary showing. The naval operations during the Mexican War, the suppression of the African slave trade, and the Japan Expedition, were likewise prolific in literature, but the great majority of naval events of this period produced anywhere from 1 to 10 items.

In form, these various literary productions range from printed official reports, proceedings of naval courts martial and courts of inquiry, and miscellaneous Congressional documents, to books of

travel, works depicting American man-of-war life, biographies of all sorts, volumes of naval reminiscence, scientific works, lithographic works, and magazine articles. The Congressional documents alone number about 125; court martial and court of inquiry proceedings, 7; books of travel, 67; works depicting man-of-war life, 23; biographies and volumes of naval reminiscence, 51; scientific works, 50; lithographic works, 11; and magazine articles, 62. Truly a wealth and variety of printed material in which to delve for historical facts.

As regards the naval historical contents of these various publications, investigation reveals the following: Of items bearing upon the diplomatic services rendered by the navy during this period, there are about 30, one-third of which are not touched upon in the excellent survey of the subject published by Mr. C. O. Paullin under the title, "Diplomatic Negotiations of American Naval Officers" (1912). The Japan Expedition in 1852-4 is, of course, the shining episode in this group, with 10 items to its credit. The remaining items refer to less-known, but nevertheless important, events, such as the mission to the Spanish Provinces of South America in 1817-8, the protection of American interests during the blockade of Montevideo in 1826-8, the negotiation of a treaty with Turkey from 1826 to 1830, the embassy to Cochin-China, Siam, and Muscat in 1830 and 1836, the liberation of imprisoned American seamen in Japan in 1850, the prevention of the attempted invasion of Cuba from the United States in 1849-50, the arrest of William Walker, the filibuster, in 1857, and other minor episodes.

The opening of the Orient to American commerce was materially assisted by the voyage of the merchant ship *Franklin* to Cochin-China, in 1819-20, under the command of an officer of the United States Navy, of which an account was subsequently published. And this same commerce was afterwards furthered and extended by the persistent watchfulness of the East India squadron, culminating finally in the opening of Japan by Commodore M. C. Perry. Moreover, on various occasions—as the literature of the subject fully evidences—our trade with China was seriously jeopardized, but always strictly upheld by the activities of our squadron in those waters.

The suppression of piracy in the West Indies by Commodore Porter, in 1823-5, is well known. But other similar services were performed by the navy, which, although now almost completely

forgotten, were written up at the time and published. Thus we find accounts of the punishment of the Quallah-Battooans of Sumatra, in 1833, by Commodore Downes; the punishment, in 1839, of the acts of piracy and murder committed by the inhabitants of Muckie, also in Sumatra; the protection of American fisheries on the coast of Newfoundland in 1853; and the punishment of the Fiji Islanders by Commander Boutwell in 1855.

The American share in the suppression of the African slave trade from 1843 to 1860, as is well known, fell to the lot of the navy, and a number of records of the services performed on this arduous duty have come down to us. Mutiny also figured in the annals of our naval history in those days. Besides the memorable alleged mutiny on board the *Somers* in 1842, of which at least seven published records are extant, we have two accounts of the pursuit of the mutineers of the whaleship *Globe* among the Mulgrave Islands by the United States Schooner *Dolphin,* in 1825-6.

Of a more peaceful nature were the various surveying and exploring expeditions conducted by officers of the navy from 1838 to 1860. The first and foremost of these was the Wilkes, or South Sea, Surveying and Exploring Expedition, which was so prolific of both scientific and literary results. As mentioned before, this single episode merits a bibliography all for itself, on account of the number of books, pamphlets, and periodical articles which have been published about it. Other naval exploring and surveying expeditions of the time which have been written up are the expedition to explore the River Jordan and the Dead Sea, in 1847-8; the two Grinnell Artic expeditions, in 1850-1 and 1853-5; the exploration of the valley of the Amazon, in 1851-2; the survey of the Isthmus of Darien, in 1853-4; the La Plata exploring and surveying expedition, in 1853-6; the North Pacific Surveying and Exploring Expedition, in 1853-6; the Atlantic Cable Deep Sea Survey, in 1857-8; the surveying cruise of the *Fenimore Cooper* in the Pacific, in 1858-9; and, finally, the Chiriqui Surveying Expedition of 1860.

But these missions of peace, in which the navy was so meritoriously engaged in this golden age, were interrupted for a time by the war with Mexico, in which the navy played a signal part, as is witnessed by the published records relating thereto, about 17 in number. Later on, too, in this same period, we have records of such war-like operations of the navy as the bombardment of Greytown,

Nicaragua, in 1853-4, the suppression of the Indian uprising in Washington Territory in 1855-6, and the unsuccessful expedition against Paraguay in 1858-60.

In the cause of humanity, also, the navy won for itself lasting laurels during this period. Writers have recorded the voyage of the *Jamestown*, in 1847, to relieve famine-stricken Ireland, the expeditions in search of Sir John Franklin and his companions (mentioned above), and the Kane Relief Expedition in 1855. On the other hand, contemporary historians have had to record several American naval disasters, as the conflagration on the *Missouri* off Gibraltar in 1843, the wreck of the *Boston* in the Bahama Islands in 1846, the loss of the *Somers* during the Mexican War, and the loss of the *Albany* during her cruise in 1852-4.

This was also, *par excellence*, the period of extraordinary cruises for naval vessels. Circumnavigations of the globe appear to have been the order of the day. No fewer than 20 such circumnavigations of naval vessels have been recorded in ample detail. The distances covered in some of these cruises frequently totaled 60,000 to 70,000 miles. In one case the maximum distance of 100,000 miles was reached, but strange to say no complete account of this famous cruise appears ever to have been published. In making these cruises, also, the vessels were frequently away from home continuously for from three to five years. Naturally, the contemporary accounts of these voyages are replete with information regarding the mode of life pursued on board; and yet this field of research has been practically left untilled. Our officers and men of the old navy were at pains to record what to them must very often have been the commonplaces of existence, but which to us would prove to be as interesting as a journey of observation through a strange land. And there are, in truth, some veritable gems among these old records. Moreover, the one that is no doubt most familiar to present-day readers—Melville's "White Jacket"—loses much of its originality in the light of what was published just prior to it by the less-known pioneers in that kind of writing. Altogether, there are nearly 25 such records which throw light upon the man-of-war life of that interesting period.

Another fruitful source of naval historical data is provided by the numerous biographies of officers and men who flourished during those years. There are biographies, autobiographies, memoirs, volumes of reminiscence, and letters, written by all ranks of officers

from commodore down to midshipman, and several of them written even by men before the mast. A number of the subjects of these biographical volumes saw service in the navy throughout the entire period of this golden age, notably Commodores M. C. Perry, Hiram Paulding, A. H. Foote, D. G. Farragut, and Josiah Tattnall.

But the most popular form of publication resulting from the operations of the old navy appears to have been the narrative of travel. It cannot be denied that the cruises of our naval vessels afforded excellent opportunities for seeing certain wonders of the world, and the literature of travel has been correspondingly enriched thereby. Thus the Mediterranean squadron visited the ports of Europe, northern Africa, and the Levant; the Brazil squadron, the east coast of South America; the Pacific squadron, the west coast of South and North America and the islands of the Pacific Ocean; the East India squadron, the various ports of Asia; the West India squadron, the islands of the West Indies and the ports on the Gulf of Mexico; the African squadron, the west coast of Africa; while occasionally other special ships visited every known quarter of the globe washed by the seven seas.

In the exercise of their profession, also, certain naval officers of the time became highly proficient in scientific pursuits. We have, for instance, the contributions made to hydrography and meteorology by Lieutenants Charles Wilkes, M. F. Maury, S. S. Lee, O. H. Berryman, and the various other naval officers connected with the survey of the coast of the United States; then the astronomical researches of Lieut. J. M. Gilliss, Lieut. C. H. Davis, and Chaplain George Jones; the investigations of the officers attached to the Light-House Board; the contributions to ethnology and physical geography made by Lieutenants I. C. Strain, W. L. Herndon, Lardner Gibbon, W. F. Lynch, and T. J. Page; the Arctic explorations of Surgeon E. K. Kane and Lieut. E. J. DeHaven; the improvements in ordnance and gunnery made by Commander D. G. Farragut and Lieut. J. A. Dahlgren; the development of the art of navigation by Lieut. M. F. Maury; and the botanical and medical works of Surgeon W. P. C. Barton. While to the South Sea Surveying and Exploring Expedition a number of civilian scientists, notably James D. Dana, Charles Pickering, Asa Gray, S. F. Baird, and A. A. Gould, owed the first thorough grounding in their respective fields of research. Furthermore, the draughtsmen attached to that expedition, as also to the Japan Expedition,

left monuments of their artistic achievement in the form of volumes of colored plates which stand to-day as marvels of early American lithographic art.

Mention must also be made of the naval authorship of a great portion of this literature. Of works written by naval officers, covering this period, we count upwards of 70, the authors being represented by all ranks and grades of the service—officers of the line, medical officers, pay officers, chaplains, schoolmasters, and professors of mathematics. But what is much more interesting, and at the same time highly creditable to our country, is the fact that 18 works are from the pens of enlisted men (bluejackets and marines), the earliest of these having appeared about the year 1834. Then, too, among the various authors of all sorts represented in this survey, are to be found a number of writers of note, the most notable being Nathaniel Parker Willis, James Fenimore Cooper, Nathaniel Hawthorne, Herman Melville, Bayard Taylor, Walter Colton, W. S. W. Ruschenberger, Charles Nordhoff, Henry Augustus Wise, and Alexander Slidell Mackenzie.

Some of the works under consideration were furthermore regarded as of sufficient importance to be published in foreign editions. We find British editions of 15 of them, a French translation of one, and a Dutch translation of another. Moreover, many of the works passed through several editions, the number in one case amounting to eight. On the other hand, several works are now extremely rare; so much so, indeed, that in the case of four items the writer has been unable thus far to locate even a single copy.

Enough has doubtless now been said to demonstrate that this rich but neglected field of American literature is worthy of being tilled to the utmost. Mr. C. O. Paullin gave hope for a time that he would make this task peculiarly his province, but other labors have apparently diverted him from the purpose. Mr. R. W. Neeser has also advanced a short distance into the field, as had likewise the late Mr. E. S. Maclay. But until the work is taken up in earnest by a number of students, the treasures will continue to remain stored away in many scattered and out-of-the-way places. Let us hope, however, that the day will come when they will be raised from obscurity into the glorious light of America's naval prestige.

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PRACTICAL HINTS ON HANDLING A DESTROYER

By LIEUTENANT R. O. GLOVER, U. S. Navy

The large building program that our government inaugurated in 1918 to combat the submarine menace in the World War has given the navy 300 destroyers of the flush deck type. These vessels are more nearly homogeneous in hull design than any other types that make up our fleets. In addition, they are all turbine driven, with two out-turning screws. The main engines are either Parsons or Curtis design, or some slightly modified design that permits the altered type to be included under one of the two main heads. These facts are of particular interest to the destroyer commander, for it permits him more easily to learn the maneuvering qualities of the vessels as a class. At the same time, it simplifies the presentation of these "hints," and, unless it is specifically pointed out to the contrary, the information given in this article refers to any destroyer of the flush deck type.

This large destroyer force demands for its efficient maneuvering a very much larger percentage of regular officers than the smaller force of destroyers of pre-war days needed from the navy as a whole. But the expansion of our navy has placed the experienced officers of our pre-war force high up in the grades of naval rank, leaving the present force with but few of these able destroyer commanders to teach the present personnel.

It requires no effort to admire the ease and simplicity with which the destroyer handles when controlled by the experienced commander. The type has a grip on your imagination that thrills. You would like to feel the vessel under your feet yourself, and be master of this vessel with its graceful lines of a gray-hound and the hidden power of a battleship.

The field is open, destroyers are waiting for commanders. The lieutenant is in line for captain, and orders are issued daily sending

him to this duty. It is this thought that has prompted me to put on paper these "hints." The naval officer is required to spend hours over books, ordnance, law, engineering, etc., but ship handling is evidently a heaven-sent gift, or assumed to be so. Such training as he may get is learned in the hard school of experience. The lieutenant is expected to take a destroyer out without possibly ever having been aboard one before. He learns his lesson under the lash of "get away with it." It is, therefore, the mission of this article to help bridge the gap, giving to the inexperienced destroyer captain the ideas, observations, and personal experience of one who has been through the initial test.

The first trick that you may be called upon to do in handling a destroyer may not come to you until you have been on board for some time. If this is the case you are lucky, for this period can be used in watching your captain make landings, get underway, or turn in a crowded harbor. Your attention at these times should be on the effect produced by the orders that are given to the engines. What happens with one engine backing, the other two-thirds ahead, and the rudder hard over? How far does she carry her headway after the engines are stopped from one-third ahead on both? These and similar thoughts should be constantly in your mind. At the same time, the effects of the wind and tide must be noted. The learning of these points is what is meant by "learning your ship," and it is your chief study. At the same time remember that a ship is as changeable as a woman and that you cannot take anything for granted. For this reason, keep a few tricks up your sleeve to pull in case the old girl riles up a bit.

I was one of the lucky ones in my first job, having had some three months of destroyer service. One day the orders to move came unexpectedly, and the captain was not aboard (orders have this habit in the boats). So it was up to me to get the ship underway, and go to the oil dock for oil. At the time, we were tied up port side to another destroyer, and the dock was down the bay a few hundred yards. It was a case of perfect weather and tidal conditions, so I decided to back away. But it is not my intention to tell you how I got underway and then made a landing alongside the oil dock. I will leave the methods of making landings and getting underway for treatment later. However, I believe at this moment, you will be interested to know if I was nervous. I admit that I was. But I also remember that my nervousness wore off and after

the maneuver was well underway was entirely gone. I believe that this is the experience of all officers. You can, therefore, expect to be a little nervous when you first step on the bridge, but don't let your nerves get the upper hand.

In regard to the maneuver, everything went as I had planned, and I put the ship alongside the oil dock without a hitch. The effects of the maneuver on my own morale were marked. It gave me self-confidence. However, I have made plenty of poor landings since then—and found that a landing is just something in the day's work of a destroyer skipper. So if you bungle—don't worry.

Before going on with the manner of making a landing, getting underway, etc., there are some most important speed adjustments of the main engines that should be made for good maneuvering. These are best made at sea, with plenty of room, and after they are once made you are fixed for your cruise.

The maneuvering speed for both engines standard ahead is 15 knots. A few "old timers" have used 20 but the consensus of good practice does not back them up. In fact, at 20 knots things happen too fast for most of us. One novice tried 20 knots as standard speed for maneuvering in leaving the New York Navy Yard for the first time, and for the first time he had handled a destroyer. The results were disastrous, as might be expected, and he took his ship out of the yard after ramming two lighters, and giving a battleship tied up in there enough thrills to last a year. Talking to his executive, who was an old destroyer officer, he laid the blame on the speed, since the situation was out of control before it could be sized up properly.

Having decided on 15 knots for maneuvering speed, and with your ship at sea, or with plenty of room, adjust the turns of the engines so that with one engine backing one-third and the other making ahead one-third the resultant force will give the destroyer a little headway. Similarly, make the adjustments for two-thirds, and for standard ahead and back full. This arrangement will keep headway on the ship, when using equal power for turning with both engines. Full ahead is 20 knots, and back emergency full at least 20 plus whatever else they have below.

Let us now consider the most elementary point in maneuvering, namely turning a destroyer with the engines. The turning circle of a destroyer making 15 knots through the water is 850 yards,

but by using the engines, you can cut this circle, with ordinary conditions of wind, down to 350 yards. The points to be remembered in this maneuver are, first, to keep headway on as long as possible, and, second, when forced to back, to go astern for as long a reach as possible before coming ahead again. The problem of turning was of almost daily occurrence in entering San Diego harbor (the tide is never right, you can nearly always bet). The harbor there was on an average 500 yards wide. Destroyers were moored in groups of six to one buoy, which was about 300 yards from another buoy. The larger ships were 500 yards apart. In addition a ferry crossed as noted in the sketch (Fig. 1). The tidal current at the flood or ebb was on an average from three to five knots. The term "crowded harbor" could at most times be correctly applied, and the situation demanded a quick turn. In meeting this situation I used the following general plan: Referring to Fig. 1, I would stand into the harbor at 10 knots (required by the force commander's orders), until abreast of the *Melville*. Here I would ring "standard speed" (15 knots), and steer the course indicated by the dotted line. Immediately after passing the *Charleston* (note flood tide), "Right rudder, 25 degrees," "Starboard engine stop," and waiting for the ship to start swinging rapidly (about 15 seconds) "Starboard engine back two-thirds." The headway of the vessel was gradually slowed by the backing engine, and by the time the ship was half through the turn (point *R*), I was able to size up the situation ahead, and, if a bit doubtful of the sea-room would give "Port engine ahead two-thirds." The effect would of course further slow the headway, but, having the engines adjusted, the vessel still kept a little headway, and continued to turn. Usually, I found that this was all that was necessary to complete the turn. However, in some cases when a strong wind was blowing on the starboard bow, I could see soon after passing point *R*, that there was not room to complete the turn. In this case "Port engine stop," "Shift the rudder" (as soon as the vessel lost headway), and back. On gaining sternway, the stern either fell off to port, or held steady. After going astern, as far as I had room, "Port engine stop," "Port engine ahead standard" "Shift your rudder" (as soon as the vessel loses sternway). After gaining headway, backing the starboard engine would generally complete the turn.

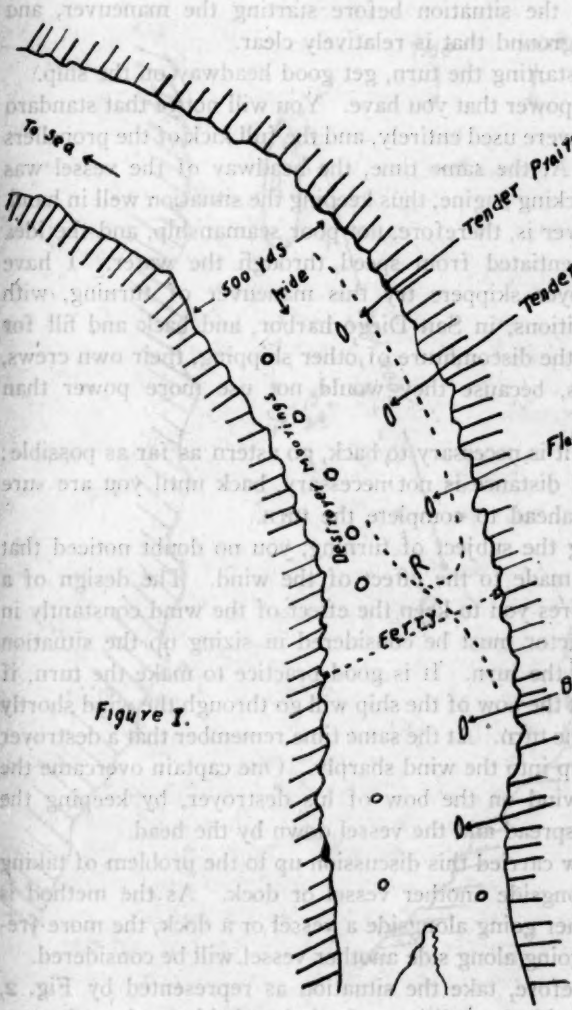
To sea
500 yds
Tide
Tender Prairie
Tender Melville
Flagship Charleston
Destroyer moorings
Ferry
Birmingham
Buffalo

Figure 1.

In giving this concrete example of turning, I have in mind some fundamental ideas that were illustrated therein, and which I reiterate for emphasis:

(a) Size up the situation before starting the maneuver, and pick a turning ground that is relatively clear.

(b) Before starting the turn, get good headway on the ship.

(c) Use the power that you have. You will notice that standard and two-thirds were used entirely, and the full kick of the propellers thus secured. At the same time, the headway of the vessel was killed by the backing engine, thus keeping the situation well in hand. The use of power is, therefore, not poor seamanship, and the idea must be differentiated from speed through the water. I have watched destroyer skippers try this maneuver of turning, with favorable conditions, in San Diego harbor, and back and fill for a half hour, to the discomfiture of other shipping, their own crews, and themselves, because they would not use more power than two-thirds.

(d) In case it is necessary to back, go astern as far as possible; or, if this total distance is not necessary, back until you are sure there is room ahead to complete the turn.

In discussing the subject of turning, you no doubt noticed that reference was made to the effect of the wind. The design of a destroyer requires you to keep the effect of the wind constantly in mind. This factor must be considered in sizing up the situation before starting the turn. It is good practice to make the turn, if possible, so that the bow of the ship will go through the wind shortly after starting the turn. At the same time remember that a destroyer tends to back up into the wind sharply. One captain overcame the effect of the wind on the bow of his destroyer, by keeping the after awnings spread and the vessel down by the head.

We have now carried this discussion up to the problem of taking a destroyer alongside another vessel or dock. As the method is the same whether going alongside a vessel or a dock, the more frequent case of going along side another vessel will be considered.

Let us, therefore, take the situation as represented by Fig. 2, with practically ideal conditions of wind and tide, and see how to go about making a landing. Before starting to stand in on the course to bring the destroyer alongside, maneuver the vessel approximately into position *B*, at which place the engines will be making two-thirds speed ahead and the distance from the bow

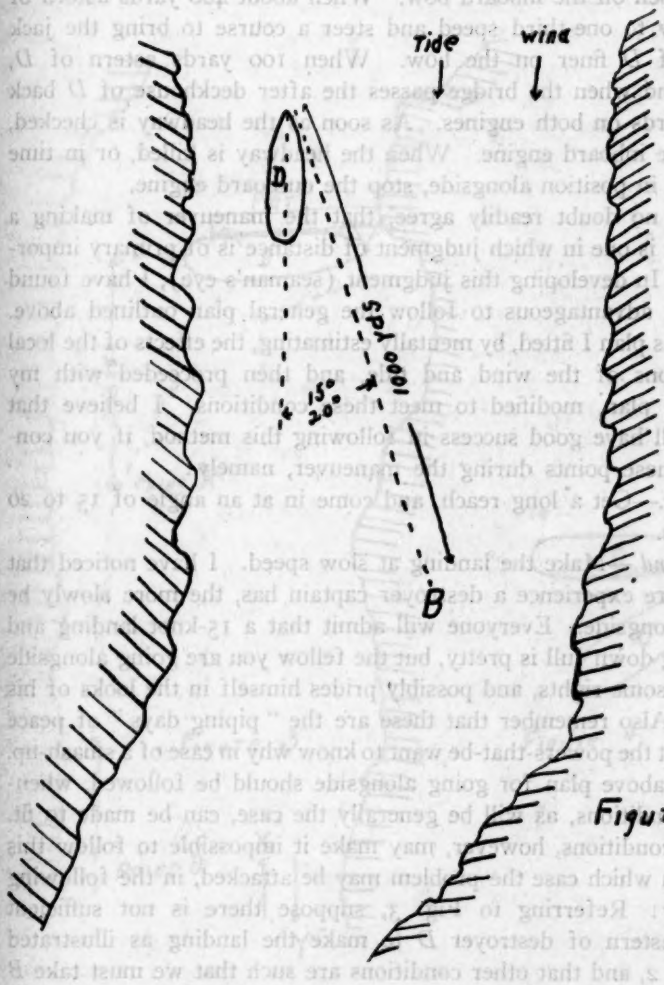

FIGURE 2.

of the vessel that it is desired to moor to, *D*, will be about 1000 yards. From this position, head in on a converging course of approximately 15 degrees, keeping the jack staff of vessel *D* a little open on the inboard bow. When about 400 yards astern of *D*, slow to one-third speed and steer a course to bring the jack staff of *D* finer on the bow. When 100 yards astern of *D*, stop, and when the bridge passes the after deckhouse of *D* back two-thirds on both engines. As soon as the headway is checked, stop the inboard engine. When the headway is killed, or in time to land in position alongside, stop the outboard engine.

You no doubt readily agree, that the maneuver of making a landing is one in which judgment of distance is of primary importance. In developing this judgment (seaman's eye), I have found it most advantageous to follow the general plan outlined above. Into this plan I fitted, by mentally estimating, the effects of the local conditions of the wind and tide, and then proceeded with my general plan, modified to meet these conditions. I believe that you will have good success in following this method, if you consider these points during the maneuver, namely:

First.—Get a long reach, and come in at an angle of 15 to 20 degrees.

Second.—Make the landing at slow speed. I have noticed that the more experience a destroyer captain has, the more slowly he goes alongside. Everyone will admit that a 15-knot landing and backing down full is pretty, but the fellow you are going alongside of has some rights, and possibly prides himself in the looks of his ship. Also remember that these are the "piping days" of peace and that the powers-that-be want to know why in case of a smash-up.

The above plan for going alongside should be followed, whenever conditions, as will be generally the case, can be made to fit. Local conditions, however, may make it impossible to follow this plan, in which case the problem may be attacked, in the following manner: Referring to Fig. 3, suppose there is not sufficient room astern of destroyer *D* to make the landing as illustrated in Fig. 2, and that other conditions are such that we must take *B* as the starting point.

In this case stand-in on course *BR* (dotted line) at two-thirds speed, keeping as far over to the left as possible. When at *R* stop both engines, and put the rudder hard right. Back two-thirds on the starboard engine, at the same time steadying up with the

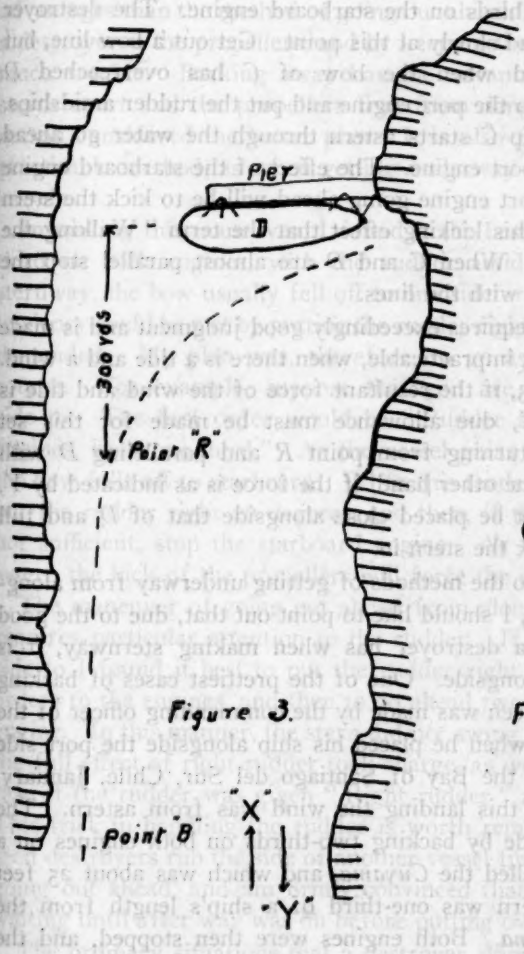

Figure 3.

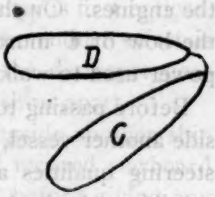

Figure 4.

jack of *D* on the port bow. The ships will by this time be in the relative positions indicated by Fig. 4, and the problem becomes one of "walking the stern in" with the engines. To do this, keep the rudder right, go ahead one-third on the port engine, and continue to back two-thirds on the starboard engine. The destroyer *C* is still going ahead slowly at this point. Get out a bow line, but leave it slack, and when the bow of *C* has overreached *D* about 10 yards, stop the port engine and put the rudder amidships. As soon as the ship *C* starts astern through the water go ahead two-thirds on the port engine. The effect of the starboard engine backing, and the port engine going ahead will be to kick the stern to port, and it is this kicking effect that the term "Walking the stern in" implies. When *C* and *D* are almost parallel stop the engines, and moor with the lines.

This maneuver requires exceedingly good judgment and is made very difficult, if not impracticable, when there is a tide and a wind. Referring to Fig. 3, if the resultant force of the wind and tide is as indicated by *X*, due allowance must be made for this set towards *D* while turning from point *R* and paralleling *D* with the engines. On the other hand, if the force is as indicated by *Y*, the bow of *C* must be placed close alongside that of *D* and full power used to walk the stern in.

Before passing to the methods of getting underway from alongside another vessel, I should like to point out that, due to the good steering qualities a destroyer has when making sternway, it is possible to back alongside. One of the prettiest cases of backing down that I have seen was made by the commanding officer of the U. S. S. *Simpson* when he placed his ship alongside the port side of the *Cuyama* in the Bay of Santiago del Sur, Chile, January, 1921. In making this landing the wind was from astern. The maneuver was made by backing two-thirds on both engines on a course that parallelled the *Cuyama*, and which was about 25 feet away until the stern was one-third of a ship's length from the bow of the *Cuyama*. Both engines were then stopped, and the rudder put left momentarily to start the stern left, and then shifted to amidships. As soon as the rudder was amidships, both engines were signalled standard ahead. In this maneuver it is the handling of the rudder that must be carefully watched, for it is apparent that if the rudder had remained left, and then the engines had been

put standard ahead, the stern would have swung right, and possibly into the *Cuyama*.

The problem of getting underway from alongside another vessel is generally solved by backing away, and this method has more advantages than the method of going out ahead. The tender part of a destroyer is the propellers, and by keeping them clear one avoids much trouble. Backing away has the advantage of getting the sterns apart and the propellers free from danger. It is for this reason considered the better plan. It is also frequently the only practicable method, as when getting underway from between two vessels.

In making this maneuver, I found it the best plan to back one-third on both engines, with the rudder amidships. On gaining sternway, the bow usually fell off to one side or the other, but this tendency could be met by putting the rudder right or left, as the case demanded. My plan was, therefore, to go astern on a parallel course. For example, suppose that you are moored starboard side to. The first order would be "Rudder amidships," "Both engines, back one-third." As the vessel gains sternway, suppose the bow falls off to starboard. When this tendency is first noticed, put the rudder right 20 degrees, and then, if the rudder effect is not sufficient, stop the starboard engine. As the destroyer goes astern the kick of the propellers will force the ships apart.

The maneuver of going out ahead from alongside another ship requires particular attention to the rudder. If moored starboard side to I found it best to put the rudder right before giving any orders to the engines, and then to go ahead two-thirds on the port engine. In this manner, the stern did not swing to the right before the full effect of right rudder took charge, as would have been the case if the rudder was given "Right rudder" after way was on. This trick in handling the rudder is worth remembering. I have seen destroyers rub the side of another vessel time and again when going out ahead, and am firmly convinced that it was all due to waiting until after way was on before putting over the rudder.

The ordinary situations that a destroyer skipper has to meet in moving his ship have been presented to you, while the exceptional, or trick maneuver has been avoided. As pointed out in the introduction, it was the intention of the writer to help bridge the "gap" for the novice destroyer commander. But after all, actual experience is the only method that will perfect you, and no amount of reading can replace it.

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THE STEREOGRAPHIC PROJECTION FOR STAR IDENTIFICATION AND STAR "SPOTTING"

By G. T. RUDE, Hydrographic and Geodetic Engineer,
U. S. Coast and Geodetic Survey

It is evident that in general problems which lend themselves to solution by means of tabular values may also be solved by the use of some graphic device. While this may in some cases entail a slight decrease in accuracy for theoretical problems, it is unquestionably sufficiently accurate for all practical purposes. A diagramatic solution has the advantage however over tabular or computed solutions of requiring far less time and further that the results may be more easily and quickly grasped, the diagram tending to transform an abstract problem into concrete form.

With this idea in mind the writer, while navigator of a troop transport during the war, conceived the idea of employing a graphic means of star identification to take the place of star identification tables which at best are far from satisfactory. The stereographic projection was selected as the one best adapted to the purpose. The accuracy of the results obtainable and the fact that almucanter circles could be introduced, admitting of identification by altitudes only, justified the use of this projection. The introduction of the almucanter circles further made possible another application which may be called "Star Spotting" for lack of a better term. This permits the location of stars and planets very expeditiously and closely in azimuth and altitude before they become readily visible to the unaided eye, thus allowing the navigator to secure star observations while the horizon is clearest—immediately after sunset.

In the PROCEEDINGS for September, 1921, Lieut. Commander L. V. Keilhorn, U. S. C. G., in his article "Approximate Altitude and Azimuth" illustrated an interesting, practical use of the stereographic projection for securing altitudes and azimuths. He made

use of the horizon projection, plotting the celestial bodies as occasion arose by means of hour and declination circles. The present writer employed two applications of the stereographic projection—the polar projection on which the celestial bodies are permanently plotted by means of their tabulated right ascension

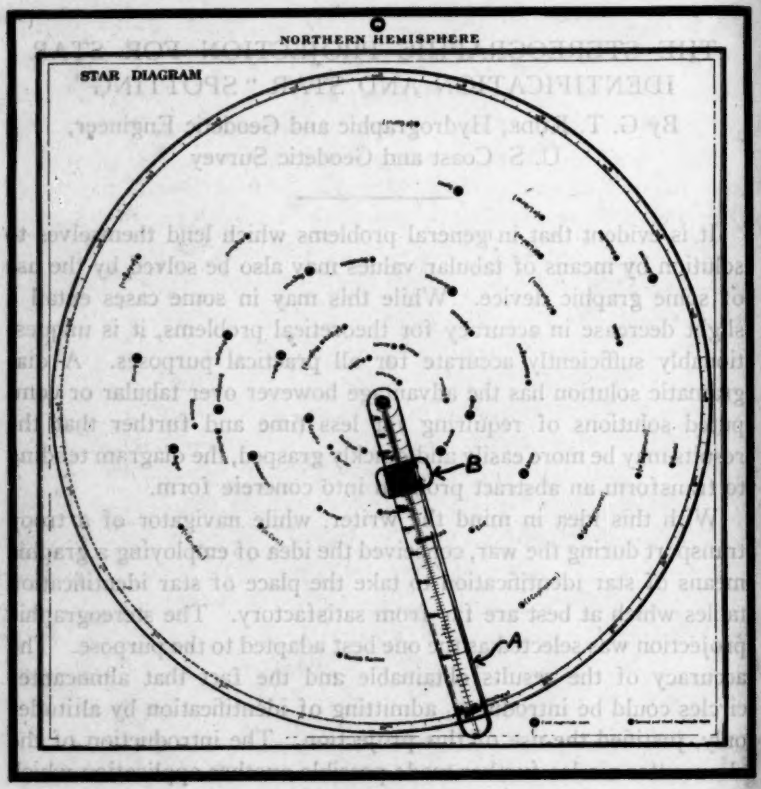

FIG. 1.

and declination, and the horizon projection on which are projected the zenith of the observer and azimuth and almucanter circles for the latitude of the observer.

By locating on the polar projection the zenith and meridian of the observer, and then superimposing upon these the zenith and meridian of the horizon projection the two projections are combined and altitudes and azimuths of celestial bodies for the posi-

tion of the observer may be read by inspection from the horizon projection which is constructed on a transparent material.

Fig. 1 is a diagram of the northern celestial hemisphere on a polar stereographic projection, extending from the pole to declination 30° south. To obviate the confusion which the declination circles would cause when combining with the horizon projection, these are omitted from the drawing of the polar projection, and the necessary graduations for declination are supplied by means of a graduated revolving transparent arm (*A*, Fig. 1). The periphery is graduated for right ascension in hours, subdivided into

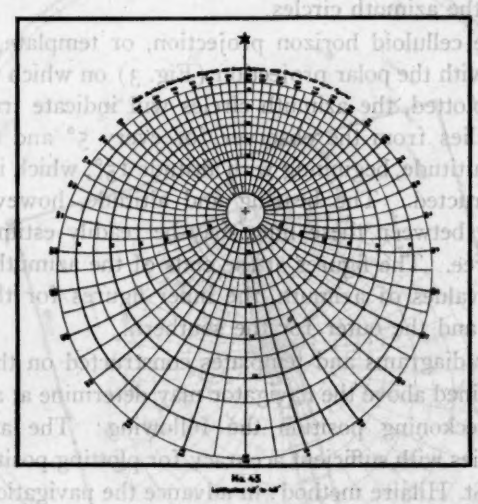

FIG. 2.

10- and 2-minute intervals. First magnitude, and some second and third magnitude, stars are permanently plotted on the projection by their declinations and right ascensions. The projection may also be used for the planets by plotting their positions occasionally. For the southern hemisphere a similar projection is used, extending from the south celestial pole to declination 30° north, thus allowing an overlap of 60° of declination on the two projections.

Fig. 2 is the stereographic horizon projection constructed on transparent celluloid for latitude 45°, N. or S. These may be called "Templates" for convenience. Results of sufficient accuracy for practical purposes can be secured three degrees either side of this parallel of construction; that is, from latitudes 42° to 48°,

either north or south latitude. It is evident therefore that 11 such templates will cover the earth between latitudes 66° N. and 66° S—for practical purposes, the whole navigable world.

The cross near the center is the projection of the zenith of the observer; the starred straight line his meridian; the curved lines radiating from the central circle are azimuth circles graduated to each 5°, the heavier lines indicating the even tenth degree and the lighter the 5° intervals, and the nearly concentric circles numbered from 20° to 80° are almucanter or altitude circles for each 5°, the even tenth degree being accentuated by a heavy line as in the case of the azimuth circles.

When the celluloid horizon projection, or template, is used in connection with the polar projection (Fig. 3) on which the celestial bodies are plotted, the azimuth circles will indicate true bearings of these bodies from the observer for every 5° and the altitude circles true altitude, beginning with altitude 15°, which is the lowest circle constructed. The bearing and altitude, however, of any body falling between these lines may be readily estimated to the nearest degree. The figures at the ends of the azimuth lines indicate actual values of azimuth, the inner figures for the northern hemisphere and the outer for the southern.

With star diagrams and templates constructed on these projections as outlined above the navigator may determine at a glance for any dead reckoning position the following: The azimuths of celestial bodies with sufficient accuracy for plotting position lines by the Marcq St. Hilaire method; in advance the navigation stars and planets which will be visible at twilight or dawn; the approximate altitudes and azimuths for any given time of stars and planets ("Star Spotting"), and the identity of any star or planet, the altitude of which has been observed and its bearing estimated only, without actual compass bearing.

While the use of 11 templates, employing each template through 6° of latitude, makes the use of the projection practically universal, it is evident that all these templates will very seldom be required, depending of course, upon whether or not a vessel makes considerable change in latitude. On a vessel bound from New York to Liverpool only three templates would be necessary; from New York to the Mediterranean only one would be needed throughout the entire voyage.

When used on or near its parallel of construction altitudes and azimuths indicated by horizon projection template will agree very closely with observations or computed values. As departure is made from this parallel, altitudes and azimuths in general will differ not more than a degree from these values, even when 3° in

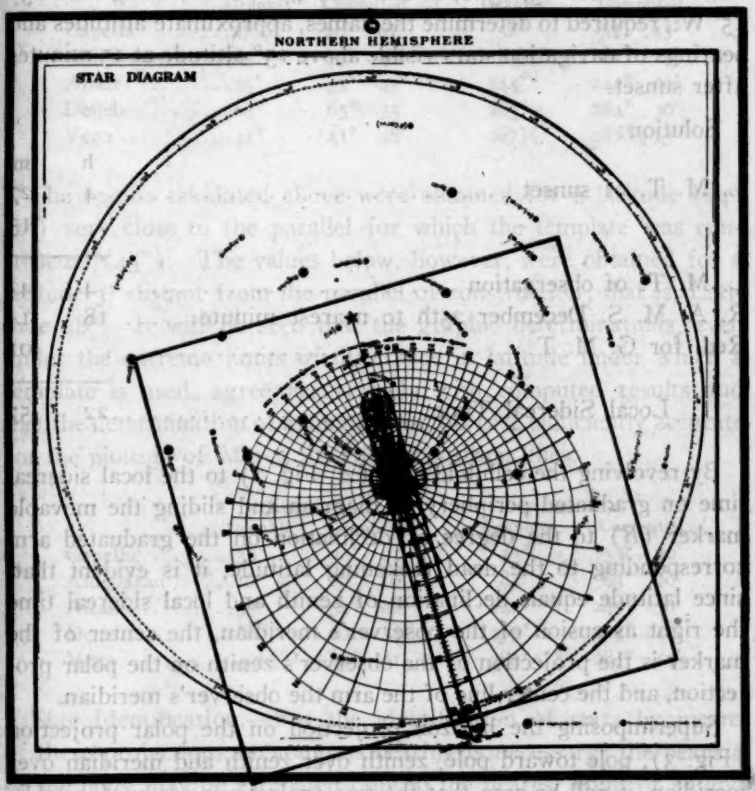

FIG. 3.

latitude from the standard parallel. This is shown in the examples given below.

Since the projections may be used both for star identification and "star spotting," examples of both will probably best serve to illustrate the method of use and accuracy of results.

"Star Spotting."—At any convenient time the probable dead reckoning position of the vessel for the estimated time of observa-

tion is roughly determined. Bearings and altitudes of suitably located stars may then be obtained graphically for that estimated time. These values may be set on pelorus and sextant to bring the desired star within the field of the telescope. The example following will serve to illustrate the procedure:

On December 25, 1921, in Latitude 44° 10′ N., Longitude 25° 15′ W., required to determine the names, approximate altitudes and bearings of navigation stars visible above 15° altitude at 15 minutes after sunset.

Solution:

	h	m
L. M. T. of sunset	4	27
		15
L. M. T. of observation	4	42
R. A. M. S. December 25th to nearest minute	18	14
Red. for G. M. T.		01
Local Sidereal Time	22	57

By revolving the celluloid arm (*A*, Fig. 1) to the local sidereal time on graduated periphery of diagram and sliding the movable marker (*B*) to the degree of declination on the graduated arm corresponding to the dead reckoning latitude, it is evident that, since latitude equals declination of zenith and local sidereal time the right ascension of the observer's meridian, the center of the marker is the projection of the observer's zenith on the polar projection, and the center line of the arm the observer's meridian.

Superimposing the horizon projection on the polar projection (Fig. 3), pole toward pole, zenith over zenith and meridian over meridian, it will be seen that the two projections are conformable, and by reference to Fig. 3 (before photographing projections were oriented to the time and latitude of this example) the following stars on the polar projection will be seen through the transparent horizon projection, their bearings indicated by the radiating azimuth lines and their altitude by the nearly concentric almucanter circles. The first columns are the graphic values from the projection and the second columns are computed values, a comparison of which will furnish an idea of the degree of accuracy obtainable.

The graphic values were taken by inspection from the writer's projections, the polar one being 16 inches square which allows of a sufficiently large scale to take out the values with a fair degree of accuracy, and at the same time is a convenient size for practical use.

	Altitudes			Azimuths		
	Graphic	Computed		Graphic	Computed	
Capella	27½°	28°	01′	52°	51°	45′
Aldebaran	15°	15°	48′	82½°	82°	15′
Altair	35°	35°	45′	244°	244°	00′
Deneb	65°	65°	35′	285°	284°	30′
Vega	41°	41°	48′	287½°	287°	15′

The results tabulated above were obtained for a latitude (44° 10′) very close to the parallel for which the template was constructed (45°). The values below, however, were obtained for a latitude 3° distant from the parallel of construction; that is, Latitude 48°. It will be seen that the graphic determinations, even under the extreme limits of difference in latitude under which a template is used, agree very closely with computed results and that the determination of azimuth is in this case sufficiently accurate for the plotting of Marcq St. Hilaire position lines.

	Altitudes			Azimuths		
	Graphic	Computed		Graphic	Computed	
Capella	30°	30°	21′	53°	53°	30′
Aldebaran	16°	16°	16′	84°	83°	20′
Altair	35°	34°	00′	242°	241°	30′
Deneb	66°	66°	14′	277°	275°	40′
Vega	42½°	42°	51′	284°	284°	10′

Star Identification.—For the identification of stars by means of these projections no compass bearing is necessary; the bearing of the body may be estimated only to the nearest point or so and the identification made absolute by means of the observed altitude and the almucanter circles of the horizon projection.

To illustrate, suppose that on the evening of December 25, after having previously determined the positions of the large stars as in our last example, none showed because of clouds, but that at G. M. T. $6^h\ 23^m\ 00^s$ through a break in the clouds an altitude of 46° 41′ 30″ was observed of an unknown star of second magnitude, a little south of East. Required the name of the unknown star?

Solution:

	h	m
G. M. T.	6	23
Long (25° 15'W)	1	41
L. M. T.	4	42
R. A. M. S. December 25, 1921	18	14
Red. for G. M. T		01
Local Sidereal Time	22	57
Dead Reckoning Latitude	44°	10′

As in the case of the last example the zenith and meridian of the observer are located on the polar projection and the horizon projection superimposed and oriented.

Reference to Fig. 3, on which the template was placed for these examples before photographing, will show the star, altitude 46°, bearing 102½° (a little south of East) to be Hamal. This is the only second magnitude star in that general vicinity of the heavens at that altitude and it is therefore evident that only its approximate direction is necessary, the altitude serving to identify it.

To sum up, by the use of 2 star diagrams and 11 templates constructed on stereographic projections, the following data for all the navigable waters may be expeditiously obtained by the navigator:

(a) Determination of azimuths of heavenly bodies with sufficient accuracy for plotting position lines by the Marcq St. Hilaire method.

(b) The names of navigation stars which will be visible at twilight or dawn.

(c) The predetermined approximate altitudes and azimuths for any given time of navigation stars ("Star Spotting").

(d) The identity of any navigation star, the altitude of which has been observed and its bearing roughly estimated.

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MISTAKEN PUBLICITY

By LIEUTENANT C. K. BLACKBURN, U. S. Navy, Retired

The navy is at present facing a very serious misunderstanding throughout the country due to mistaken publicity. The public in general sees the navy only through reports given in the press. The press notices that are given, particularly in inland cities never deal with any activity of the navy except the celebrations and reviews which are special occasions.

Few people outside of those intimately connected with the service realize that a peace-time navy is a working organization. Most of them seem to feel that naval officers and enlisted personnel are on a constant joy-ride and are always in dress uniform and at social functions. The future of the navy seems seriously menaced by this misunderstanding.

Inland congressmen are representing their constituency when they vote against naval appropriation bills. No one cares to see his money wasted on constant entertainments in which he does not have a part. If the workers and voters generally can be brought to realize that the navy in peace times is really a harder working organization, if anything, than in war times a portion of the dissatisfaction that naval appropriations cause will be remedied.

We of the service know that preparation for war is as serious a proposition as the actual warfare itself. We realize that we are devoting our energy constantly to matters which are of service to the country in general and to the individual voter. If this viewpoint can be brought home to the individual American it will be of value to the navy and to the country.

It seems logical that navy publicity can be transferred from its present endeavors of impressing the populace with its value as a social organization to its value as a working organization. The field of navy work is something which has been hardly "touched" in the public press.

There is nothing spectacular about our daily routine of life on board ship, but there is a great deal of value which can be brought to the minds of the individuals by constant impression. When the fleet goes to Guantanamo for winter exercises, officers and crew are headed for a period of hard work seldom equalled or exceeded in civilian life.

The routine of daily navy life at such periods could be so detailed and explained that it would bring to the country at large a message of the amount of work required to keep a navy ready for war.

Target practice itself is of sufficient spectacular interest to provide reading matter which would be as satisfying to the reader as the present news of the navy and its social activities. The individual activities of the fleet with the strategic maneuvers and tactics necessary to enable them to be successfully made should be a subject of fascinating interest to the average reader. It seems a shame that the people of this country are permitted to believe that naval officers are on dress parade constantly. Every time the fleet comes to port the papers are filled with the reports of entertainments ashore but never a word is written about the strenuous labors previous to arrival in such port.

Speaking personally, I know that the hardest work that has ever been my lot came when I was with the fleet and preparing for target practice, when the day started at 6 a. m. and work was never completed until at least 8.00 o'clock at night.

Cruises of the navy to foreign ports are made the subject for general rejoicing and specific advertising for recruits for the service. The value of such cruises to the commercial interest of the United States has never been sufficiently advertised. By such visits to foreign ports, strangers are given an idea of the power of the United States which is likely to make them feel that the United States is a great enough industrial country to make it worth while subject for consideration.

I do not mean to say that it is not now generally realized that the United States is a great industrial country, for such a statement would be far from the truth. But the navy's visits do tend to give a feeling of international amity which is not realized in any other way. Many people who do not come in touch with the United States in their ordinary life get a friendly feeling for the United States from getting in touch with the enlisted men and officers of naval vessels.

When President Harding reviews the fleet in New York, papers all over the country give a column to the account of the review but when some vessel in the navy breaks the record for target practice it is possible that a paragraph "squib" may possibly reach a few papers in the country. Surely the latter endeavor is the one which is of value to the country at large and particularly to the service.

The officers and enlisted men of the navy are earning every cent of their pay. Their time is almost always occupied with work which is not play in any sense of the word. Down in the bunkers, in the hot engine rooms, in the magazines and in the turrets they are putting every effort into preparing their ship for any serious trouble that may occur. They are ready to go ashore at all times to protect the interest of their countrymen. Their lives are their country's and they are not in the navy for the entertainment which the service is granted on their occasional visits to port. The activities of the navy detailed above are all excellent subjects for newspaper or magazine articles.

The purpose of this article is to bring home to the service the extent to which their activities are being misrepresented by allowing so many articles on entertainments for the navy and not seeing to it that such articles are counterbalanced by other articles on the workaday navy. Surely the newspapers of the country would be as well satisfied to receive an article on the working navy as they are to receive one on the playing navy. The amount of time that the navy spends on playing is so small a percentage of their total time that the injustice of present publicity is doubly noticeable.

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BUSINESS AND NAVY FOOD

By COMMANDER M. H. KARKER, S. C., U. S. Navy

1. The current business depression and unsettlement has served to bring home to most of us the realization of how little we know about economic cycles and the factors of business organization and administration. Forces of tremendous power and unalterable determination work their will in business with greater precision and with more persistent pressure than in politics, religion or international relations.

2. Since the days of simple barter man has recognized the fact that presumably uncontrollable forces were at work but he invariably laid their results at the door of local politics or an unfriendly neighbor. The necessity for education in business functions has been recognized only within recent years but its results have been so remarkable as to make such education a fixture in the preparation of young men for all future time. Already we have learned what these forces are and much of how they work. The time is coming when we will be sufficiently enlightened to know that they may be controlled and then the rigors of depression and the excesses of "prosperity" will be abolished.

3. There is a law in physics called the law of equal and opposite reaction. It applies with equal force in economics. So applied, it means that times of feverish prosperity and extravagance are followed inevitably by periods of equally dull business and hard times. Society is so imperfectly organized that we humans are unable to "keep our feet on the ground" or the ship of business on an even keel and straight course. We of the navy need not now interest ourselves in the *causes*. It is enough to recognize the *fact*, and to prepare ourselves to act in harmony with the movements as they occur.

4. These periods of prosperous times occur about once in every seven years (on the average) and during such times the prices of all commodities are high—just as in hard times they are low. But between the high and low points of inflation and depression there are intermediate movements in prices and in the volume of business. Plotted on a chart these movements look like a series of mountain peaks, but the *trend* is either up or down. Now it is the function of business in commodities, such as food, to purchase at the lowest price practicable; to handle, store and ship with the least expense; and to sell at the highest price obtainable. It is very easy to make money in times of prosperity and much easier to lose money in times of depression.

5. The navy is in business just as truly as are Austin Nichols or Washburn Crosby—the only difference being that we do not sell at a profit. In addition to the fact that we do not sell at a profit we are bound to maintain our stock on a basis of proper naval preparedness, a policy which forbids our working on reduced stocks in times of depression. But if we would be sure to gauge fairly the success of any supply unit we must secure affirmative answers to these questions:

(a) Is stock always available for issue?

(b) Is the amount of stock on hand reasonable, *i. e.*, is it less than the average issues for eight months?

(c) Are the issue prices on a par with, or lower than, current market quotations?

If the answers to those questions are "yes," then we may know that the supply officer concerned has followed the economic trend; has expended the government's money as he would his own and is prepared to meet the material needs of the navy. If the answers are not affirmative then something is wrong, either with the supply officer or with the policy under which he has been directed to work.

6. No large success is possible in navy supply work without the application of right principles. A constant study of the economic and commodity trends makes the storekeeper or purchasing officer efficient and valuable to the navy we serve. But business is burdened with ill considered and undigested writings on economics—writings replete with catch phrases and high sounding terms. It will be found something of a task to separate the wheat from the chaff but every grain of fact winnowed from the mass will return a hundredfold. Ultimate success will make this work pay.

7. "Business" is not a specialty to the supply corps. It is the basis upon which all supply functions are founded—the keel and ribs about which we build purchase, disbursements, supply and accounting. Business in food *is* a specialty, however, and one about which a reasonable amount of knowledge is required in the course of general supply work. Without a background of history and fundamentals storekeeping becomes a monotony and commissary work a pest.

8. Provisions and clothing are no more alike than saltwater soap and anchors. But we invariably name them together because they have been allied by tradition. The Bureau of Provisions and Clothing (among a number of others, some of which survive) was established by the Act of 31 August, 1842. That was the beginning of the present Bureau of Supplies and Accounts and the name was not changed for 50 years. The old-time paymaster aboard ship issued clothing to the crew; issued uncooked provisions to the berth deck messes and kept the pay accounts. In those easy-going days even our storekeepers ashore were civilians. But since then we have had the growth of purchase; sales; general storkeeping and accounting—to the present group of widely different professions making up the supply corps job and in which a supply officer is supposed to be equally and highly proficient.

9. From the establishment of the bureau in the navy department, food and clothing grew up together. Tradition and practice linked their names until the development of the navy forced their prime importance, and the necessity for specialization, upon the attention of the bureau. In the growth of our allied professions, the primary importance of victuals and clothes was relegated temporarily to a secondary position. With the establishment of the P. and C. Depot in 1907 the Department awakened to the fact that the old specialists had been retired and that no new ones had been trained to take their places. Courses of study were arranged with the Philadelphia Textile School and with the Department of Agriculture in Washington and a small number of officers was trained in the fundamentals.

10. With the establishment of the P. and C. Depot began the coordination of all P. and C. supply effort, including that of the naval clothing factory which had been started in 1879. Since 1907 one agency has undertaken the responsibility for specifications, upkeep, manufacture, inspection and distribution. Handled in

detail by one agency, it is not surprising that the *methods* of handling food and clothing are almost identical—that reports of both are made in the same form—that a special requisition and invoice are used when the supply officer afloat needs stock—and that one division of supply departments ashore is " P. and C."

11. But there are differences in financing and accounting that push them almost as far apart as do the differences in physical characteristics. Provisions are purchased under an annual appropriation which also provides for many expenses other than the cost of food. The amount which may be spent in any one year, therefore, is definitely controlled and fixed by the Congress and it means that the Bureau of Supplies and Accounts must be careful—even niggardly—in expenditures for labor in handling provisions. Congress is extremely shy in appropriating money for the navy and it places upon the Bureau of Supplies and Accounts the proper business burden of seeing to it that *food reaches the mess table at the lowest possible cost.* One can readily understand the effects on the ration of the unit prices paid for food and of expenditures for handling. If the amount spent for labor in provisions storehouses was not kept to the very minimum there would be no money left for the purchase of food itself and for the payment of commuted rations. And if we paid an excessive price for pineapple no supply officer could afford to issue it and the men would lose variety.

12. The expenditure or use of food is likewise rigidly fixed by law. The quantity of each class of food allowed each man each day has been fixed and issues must be accounted for by rations—a sometimes intricate, but always interesting, proceeding. The allowed variations are legion and I know of no more absorbing occupation than the administration of a general mess and the preparation of its returns. The proof of success is the excellence and variety of bills of fare and the unit cost of the ration.

13. The purchase of clothing and small stores is financed in an entirely different way. The clothing and small stores fund is a revolving and self-supporting fund now amounting to slightly over $42,000,000. That is our capital. Its profitable employment means constant care to keep enough invested in actual stock to meet issue needs but not so much invested in overcoats that there is no money to buy undershirts. As the men pay (directly or through allowance) for all clothing issued to them, the accounting

is a simple ledger return at fixed prices. For certain good legislative reasons the ledger prices are not fixed at this moment but it is only a question of a short time before uniform ledger prices will be re-established.

14. There is a general impression that men eat and wear the same things and in the same quantity year after year and that there is never any excuse for failure to have macaroni and gym shoes in stock. Nothing could be farther from the truth. Upkeep and distribution of food and clothing are not mere matters of mathematics. They depend upon climate, appetite and the distribution of naval forces. The problem in all storekeeping is not "always to have enough." That is the simplest thing to require of any human being and belief in it has caused some monumental failures. The real requirement of storekeeping is always to have enough *without ever having too much*—to meet legitimate naval needs without an excessive "inventory" and without the burden of losses by survey. To fulfill that requirement means hard work and close attention—attributes that lead to success everywhere and in every kind of job.

15. The office of P. and C. administration at the navy supply depot is charged (under the direction and control of the Bureau) with responsibility for food and clothing. That office probably exercises closer supervision over stocks in hand than is possible or in practice with any other class of navy materials. In working out the distribution of food and clothing it early developed that a record of *all* the stock in the navy would be impractical. So the control of quantities aboard ships and at the smaller yards at home and abroad is left almost entirely with the respective supply officers. Among the many continental yards and stations, however, there are seven which do the bulk of the navy supply work and these are termed primary points of distribution. They are Boston, New York, Philadelphia, Norfolk, Great Lakes, Puget Sound and Mare Island. Even these points are subject to change.

16. In the office of P. and C. administration there is maintained an accurate record of the stock of each item of food and clothing on hand at these primary points. This record is posted from a regular monthly report rendered by each of the seven supply officers. By means of this record the bureau is always in touch with the quantities available and—by elimination—with the quantities being consumed at each point. If Boston runs low in beans

we know immediately whether they can be supplied from some other yard or whether an additional purchase is essential. If the fleet should be moved suddenly from the Pacific coast, we would know exactly what food and clothing might be transferred from Mare Island and Puget Sound to the east coast yards and the shipments would be made to arrive almost simultaneously with the fleet. We depend upon this record—and it seldom fails—for essential information as to the quantities required to keep the navy supplied.

17. Each of the primary yards and stations is assigned a definite quota or proportion of the stock of food and clothing available for issue. These percentages are changed as the ships change home yards and as the appetites of the men develop. The work of P. and C. administration is not paternal to the extent of assuming all responsibility for the maintenance of stock but when the supply officer at Mare Island submits a requisition for tomatoes it is our job to recommend to the bureau a change in, or approval of, the quantity asked for and to designate a source of supply. When determining upon purchase and shipment, P. and C. keeps one object in view always—to get the food and clothing to the actual consumer with the least possible expense.

18. In the supply of food to the men of the navy no other bureau or office shares responsibility with the Bureau of supplies and Accounts. The supply corps of the navy must alone assume full responsibility for the quality, kind, price and service of the navy ration.

19. All supply officers who have been to sea are familiar with the general mess and the difficulties that beset the preparation and service of food. We all know that the ship's cooks rank with (but after) the engine room force in being difficult to handle properly and we know, to our sorrow, how quickly soup gets cold and ice cream melts. The commissary officer and the commissary steward have jobs that are envied by few—but jobs that are exceeded by none in their possibilities for the promotion of contentment and the making of a happy ship.

20. The supply officer who goes to sea is so in the habit of finding all his necessary dry stores forthcoming when he submits a requisition that he is apt not to think much about how those stores came to the storehouse or where they came from. He is apt to think of coffee as something he drinks in the morning and of

raisins as a bunch of seeds in rice pudding. But somebody in the navy is continually thinking of coffee as a bean grown in Brazil and of raisins as grapes in California. It is that phase of provisions supply work that merits more attention.

21. The navy specifications for food are very rarely the product of entirely original thought and research. Most of the food we eat has been in common use for hundreds of years—only the standards of purity and grading change from time to time. But at the navy supply depot there is a force of officers and specialists engaged continuously in keeping abreast of the developments in the growing, handling and packing of food products and these men spend a very considerable part of their time in original research work in an endeavor to improve the quality or the grade or the packing of navy food without increasing ultimate cost. In all of this work the force on specification revision keeps in mind the ultimate consumer—the man aboard ship who answers mess call and who must eat what is put before him.

22. After the preparation of the specifications comes the question of how much to buy and where to keep it. The question of storage is a much simpler one than the question of quantity, for while all foods are perishable, some are more perishable than others and the stock of these must be replenished with greater frequency. No amateur would attempt to keep rolled oats for the same length of time as sugar and it becomes a nice question as to what length of time food may reasonably be expected to keep without deterioration. Some years ago the Bureau of Supplies and Accounts investigated this subject very thoroughly and published in the *Bureau Memoranda* a table of keeping qualities of food. A study of this table, and a careful compliance with its instructions, will pay the commissary officer many times over in the reduction in the cost of ration through smaller losses by survey. When you determine on your requisition to fill stock do not, by any chance, attempt to carry the more perishable items for the same length of time that you can carry tinned fruits and the standard vegetables.

23. All food is not harvested and marketed at the same time of the year. A number of the less important items are continuously available—perennials, as it were. But most of the items of navy food have their greatest period of production at the same time each year and the navy—like any prudent housewife—makes its purchase when the stock is in greatest supply and the price—theo-

retically— at the lowest point. To determine the time of purchase we must consider the variation in the time of pack. As an example let us consider the case of tinned peas. Peas mature at different times in different sections of the country. They are packed in Maryland in the months of June and July, the heaviest pack running from the 15th of June to the 15th of July. They are packed in the northern states during August, September and October, the heaviest pack running from the 15th of August to the end of September. They are packed in the western states during the same months as in the northern states but the heavy pack extends only during the month of September. It is quite impossible for the navy to restrict its purchase to the peas produced in any one section of the country so we submit the requisition on or about the 1st of May of each year and the Bureau of Supplies and Accounts opens bids on or about the 1st of July. By requiring delivery on the 1st of October the navy gives every packer of peas in the country an opportunity to bid and the chance of selling his product to the service and securing world-wide distribution in use.

24. In determining the quantity to buy it has been found undesirable to rely solely upon the regular monthly reports of peas on hand. Accordingly a special report is requested from each primary distributing point about two weeks before the requisition is due to be submitted and supply officers report the quantity on hand and their own estimates of the quantity required for the succeeding 12 months. These reports and estimates are tabulated in the navy supply depot and the estimated needs compared with the average requirements published by the Bureau of Supplies and Accounts. As the navy prepares its requisition in May and as no new peas will be available until the following October, it is necessary to buy for 17 months ahead and not for 12 months. Every estimate is carefully considered and the quantity required determined—so far as human foresight makes this possible—on the basis of the men then in the navy and the authorized strength for the coming year. The determination of these quantities is not purely a matter of mathematics but involves climate, appetite and the movements of the naval forces. It is quite impossible for any human agency to foretell accurately changes in the appetite of the enlisted personnel of the navy or the preferences of supply officers in the preparation of bills of fare. We maintain stock largely on the basis of average past demands and this reliance on averages sometimes finds the

navy with an over stock in one item and under the necessity of purchasing some other item or items before the regular pack season.

25. For a number of years the Bureau of Supplies and Accounts has been endeavoring to induce producers and packers to deal direct with the navy instead of through established brokers and wholesalers. It is very evident that the price to the consumer must be increased every time the product changes hands from the time it is packed. In the normal course of civilian food distribution, food passes from the packer to the broker, to the wholesaler, to the jobber, to the retailer, to the consumer. Each of the four intermediaries between the packer and the consumer takes his profit on the transaction. Ordinarily the navy succeeds in by-passing the jobber and the retailer but still too large a proportion of our purchases are made from the wholesaler and the broker. If we could only induce the packers of the country to deal direct, it would enable us to eliminate and save two profits on every transaction. This is not a discussion of the necessity for all of these intermediaries in civilian distribution nor must it be considered a claim that their existence is necessarily an economic waste. But so far as the navy is concerned their services are unnecessary and wasteful and we should eliminate them just as soon as it is possible to convince the producers, packers and canners that business with the navy requires no special influence and involves nothing more than integrity and a desire to sell honestly described merchandise at a fair market valuation.

26. After the contracts are awarded by the Bureau of Supplies and Accounts, the navy supply depot undertakes to conduct factory inspection on as large a proportion as possible of the food for the navy. It is not possible, of course, to maintain an organization sufficient for the factory inspection of everything we buy but factory inspection is advantageous to the navy in that it demonstrates conclusively that the navy is interested in the conditions under which its food is prepared and it appeals to the seller because it eliminates the uncertainty of acceptance; expense of transportation on rejected material; and gives him payment for the material accepted within a few days after the shipment has been made.

27. All food is not inspected at the factory and in such cases, after material has been delivered by the contractor direct to the primary point which is in need of stock, the local supply officer withdraws representative samples from every delivery received

and forwards such samples to the navy supply depot for analysis, grading and comparison with the sample under which the purchase was made. It is not until the report of acceptance is received that the inspection calls are passed and public bills prepared. Every delivery is painstakingly compared with the specification requirements and with the samples submitted at the time the bids were opened, chemical and microscopical examinations are made wherever applicable and all of the gradings are verified by recognized experts of long standing. "Doubtful food is bad food" and is always treated as such. Food which passes navy inspection must not only be wholesome but it must have flavor and appearance equal to the standard and of such quality as to appeal to the appetite of the present-day fastidious sailorman.

28. It is quite impossible to cover the details of procurement, storage, inventory, issue and accounting for food aboard ship. Most of these things have been laid down by the Bureau of Supplies and Accounts in unequivocal language. If the commissary officer will take the time to study these instructions he will never have trouble in obtaining food when he wants it but unless he does his part he can't expect the supply officer ashore to do his own job and the commissary officer's too. Give the supply officer as much notice as you can when you want stores; stow provisions aboard ship so that the oldest material is always available and is used first; stow everything in regular tiers so that it may be inventoried without being broken out; invariably issue the oldest stock first and keep a close watch on the remainder so that you may be sure that you know as soon as it begins to deteriorate.

29. The preparation and service of food aboard ship is one of the most interesting of supply corps jobs. It probably presents the greatest opportunity supply officers have for constructive development and the promotion of contentment. I have never yet seen a happy ship which did not have an efficient commissary officer and the rigors of many "mad houses" have been alleviated by a good mess. In a large measure the supply officer has the health and contentment of the crew in his custody and all of his work in preparing tasteful and varied bills of fare will be repaid many times over.

30. I wish that it might be possible to indicate some of the primary sources of navy food. Familiarity makes of a bag of beans a prosaic thing and of a can of salmon only "gold fish." But, really,

they are uninteresting only if they are a detail. Coffee should mean more than a beverage. It should mean bushes in the mountains of Santos; mule trains to the coast; sweating stevedores; ships' holds; New York warehouses; expert coffee tasters; blenders and roasters; milling machines; gas heated cylinders; stoners, grinders and the final aromatic, dark brown granules in air-tight containers for the ships of the navy. Vanilla extract is something beside a flavoring for puddings and cakes. It should mean a bean grown in Mexico; transportation of the crudest sort; and the expert services of chemists and artisans in the transfer of flavor and aroma from the bean to a glycerine base. Flour is more than wheat and tea more than green dried leaves. Tinned California fruits, Wisconsin peas and Maine corn have well been named "the miracle of your table." A study of the sources of food with its gradings, preparation and distribution will pay dividends in efficiency and large returns in interest. We should give commissary work the time it needs to the end that we may discharge with credit our obligation to the men we feed.

U. S. NAVAL INSTITUTE

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Life, regular and associate, 5519. New members, 6. Deaths, 1:

Lieut. E. B. Browne, U. S. N.

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The attention of readers of the PROCEEDINGS is invited to the classified analytical index for numbers 101 to 200 inclusive, which is noticed under "Publications." This is a most complete index, which has been prepared at considerable expense in order to make readily available the information contained in both the articles and the notes of these issues. Only a limited number of copies are being printed. Price, bound in cloth, $2.35; bound in paper, $1.85.

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All articles and discussions submitted by persons belonging to the navy for publication in the PROCEEDINGS must be in duplicate, one copy being signed by the author, which will be submitted to the Navy Department when the original is published, as required by General Order No. 46, of May 20, 1921.

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The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary

and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

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Notice Whole Nos. 6, 7, 10, 13, 14, 15, 17, 144, 173, 215 and 217 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

ANNAPOLIS, MD., January, 1922.

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PROFESSIONAL NOTES

PREPARED BY

LIEUT. COMMANDER R. A. HALL, U. S. Navy

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FRANCE

FRENCH NAVAL OUTLOOK.—While France's powerful army is progressing silently, having not only numbers (769,000 men in 1922), but, what is of greater moment, a trusted war doctrine that has victoriously withstood the test of the real thing, France's navy is yet under a cloud, slowly recovering from the blows it sustained in the course of the war, viz., neglect of all new construction and relative decline of the matériel, and, what is much worse, loss of the pre-war *doctrine navale*, so patiently elaborated by Admls. Daveluy and Darrieus and other painstaking pupils of the eloquent Mahan, and which events showed to be no longer adapted to our times. From the stormy squabbles that are agitating naval circles and lending interest to every *réunion* of the *Conseil Superieur* it is easy to gauge that where the *Marine Française* has suffered most is not in her matériel, but in her *morale*. Gallic naval men suffer from having been made to play a defensive rôle, to which their national temperament and training totally unsuited them. No doubt the war achievements of the French Navy are quite creditable. Only ignorant or prejudiced critics can deny that, yet, when our young officers think of Jutland, and especially of the British exploits at Dover and at Zeebrugge, they cannot help bitterly regretting that circumstances did not permit the gallant Adml. Rouyer and his cruiser squadron to make a desperate dash at the whole armada of the Kaiser and show what the descendants of Jean Bart and Duguay-Trouin could do against overwhelming odds. Inaction of systematic defensive is deadly to the naval spirit that can best thrive on traditions of offensive *à outrance* and self-sacrifice. In 1914 the French Navy had power, made up of the right stuff of seamen (think of the enthusiasm of the crews of the Rouyer and Guépratte squadrons), and the French Marine of to-day is suffering from the fact that that power was not used—at least, not used fully.

Here is the true cause of the "*malaise*" ashore and afloat, of the prevailing mistrust in those at the head and in their naval creeds and of the discouragement among young *officiers de vaisseau*, who complain of wasting their time and activity "*en travaillant dans le vide*," doing nothing or mere make-believe work.

Now, navies, to live and thrive, require a *raison d'être*, a clearly-defined object, or, as noted by Adml. Darrieus, "*une application à des cas concrets.*"

For the present critics are so numerous and so noisy that the French naval outlook is apt to appear rather unpromising to those unacquainted with the past records and the recuperating possibilities of the Gallic naval service. On the morrow of the 1870 war the marine was pronounced by President Thiers to be useless, "*un luxe superflu*," just as it had been before condemned by Minister Louvois under Louis XIV: "*La marine coute trop cher et ne sert qu' à défendre les côtes.*" Still, high spirit was in 1885 displayed by the fleet under the able *Courbet* (China war). Again, under Ministers Pelletan and Thomson (1903-1909), the French Navy was thought to be dead or dying, in such a bad way, with untrained crews, defective guns, unreliable powder and ammunition, that Adml. Touchard then declared that his battle-squadrons were disarmed, unfit to fight, though they would know "how to die with honor." Yet five years later the situation had altogether changed, and a successor of Adml. Touchard, Adml. de Lapeyrère did not hesitate to assure his captains he had assembled after a successful battle-practice that he felt ready to tackle any comer (of course, in the old Nelson-Suffren style, barring new tricks).

The truth is that things are never so bad in the Gallic Navy as they appear to be. It is especially so now since the business-like Minister Guist'hau has put an end to the post-war stagnation, sent all battle-worthy ships to sea, and set the Section Technique hard working at superior ship and gun designs in conformity with his judicious and seamanlike motto: "*La marine est faite pour navigeur et se préparer activement au combat.*" Action was the first need of the French Navy; it has revived it. The Salaun fleet, with modernized dreadnoughts, having full complements on board and a reserve of ammunition, must be proclaimed "*prête au combat*" (in pre-war style at least); and the Lequerré squadron of semi-dreadnoughts at Cherbourg will be in a satisfactory condition as soon as crews have been completed, minor repairs finished, and the practice of the sea resumed. No mean strides have thus been accomplished when it is remembered that last year there was hardly in the whole French Navy a single battleship fit to put to sea.

Senator Bérenger, *Rapporteur du Budget de la Marine*, is reproaching Minister Guist'hau with having adopted an inadequate (*insuffisant*) naval program and with delaying the taking in hand of the same. The blame is not deserved, since M. Guist'hau is to be thanked for the voting of the cruiser program by the Chamber (a formality his predecessors could not succeed in performing), and since, also, the Commission de la Marine of the Chamber criticized the 8000-ton cruiser type as being unnecessarily large and costly, this in blissful ignorance of cruiser progress in other navies. As a matter of fact, it is a lucky thing for the French Navy the Briand Ministry weathered the recent Parliamentary tempest, as a governmental crisis would have further delayed shipbuilding. The Guist'hau program may not be much, but it is something, whereas if Ministers of Marine are to be changed every eight months nothing more than a nominal French fleet, without either worth or prestige, will be obtained, whatever expenditure is wasted in so-called Budgets de la Marine. Without stability and continuity of views at the head, no bona fide sea power is obtainable, and, with her peculiar system of mismanagement, the *République Française* is, year in and year out, wasting assets of strength and efficiency only second to those of Great Britain. Indeed, it is a strange spectacle for a great country to keep on "*jouer au marin*" in this expensive and fruitless

guise. No wonder many think with ex-Minister of War Lefèvre it would be more sensible once for all to recognize the incompatibility between the Republican instability and naval efficiency, and to shape accordingly the foreign policy of France.

With the Paris Parliament lies the responsibility for the French maritime decline. As noted by Député de Grandmaison, an efficient striking force on the water is not so much a matter of finances as of *"vouloir"* of will; and the Chamber is wholly absorbed by party quarrels and has no time to devote to sea affairs that are, moreover, completely ignored by the bulk of *Messieurs les Députés.* There has never been a *Budget de la Marine* which the Chamber has not curtailed and maimed. There has never been a naval program it has not delayed or reduced; and it is truly a marvel to think that under this *"règne de l'absurde"* the *Marine Francaise* has managed to live and is yet giving signs of a sturdy inward life. Under similar circumstances, especially when are reckoned the many disastrous consequences of instability in management, no other navy would have survived.

The Chamber and Senate will be asked this month to vote 965,000,000 francs for the Guist'hau program, of which 223 millions are to be expended in 1922, 344 millions in 1923, 327 millions in 1924, and 71 millions in 1925, in the construction of three 8000-ton cruisers of 35 knots, six 2400-ton and 36-knot scouts (probably three 140 mil. guns), 12 destroyers of 1200 tons, and 12 submarines of 1100 tons. In addition, credits will be asked for a *"program d' aéronautique"* that is ready and for a *"programme de défensive des côtes"* prepared in collaboration with the war office, that contains interesting innovations.

The 1922 *Budget ordinaire* was to attain 939,948,000 francs (about 350 million in pre-war money), against 951 million francs in 1921. Unfortunately, the Minister of Finances, who (amusing to note) is a late President de la Ligue Maritime, has already made a reduction of 96 million francs in next year's Budget, and he wants still further "economies," for the good reason that France has in 1922 a projected expenditure superior by some two milliard francs to her normal income, as the consequences mostly of the German devastations and partly of the growth of *"fonctionnarisme."*

A strong demand is anew being made for a reduction in the number of arsenals. While Brest, Toulon, and Bizerta will be preserved as first-class *ports-militaires,* it is probable that Rochefort will be suppressed and Lorient and Cherbourg reduced to the rank of secondary bases and arsenals.—*Naval and Military Record,* 16 November, 1921.

PARIS DEPUTIES ADOPT LARGE NAVAL BUDGET.—The chamber of deputies to-day (6 December) adopted provisionally the naval budget of 844,000,000 francs, which covers the commencement of and progress on three light cruisers, six torpedo boat destroyers, twelve torpedo boats, twelve submarines and one airplane carrier; and later in addition three cruisers and 24 submarines.

It developed during the debate that annual construction probably would cost 333,000,000 francs, making future naval budgets average 1,200,000,000 francs. This would include 50,000,000 francs annually for submarines and coast defense.

Admiral Guepratte, describing France's fleet as almost nonexistent, said that five of the former German warships, despite the fact that they are antiquated, are France's best units.

It was remarked during the debate that the present naval appropriation was only 5 per cent of the total budget compared with 13 per cent in 1914. The present budget increases the naval personnel from 51,000 to 57,000.

France now has about 50 submarines, mostly small and many of them obsolete. The best of them are ten 800-ton boats surrendered by Germany. Admiral Guepratte and other deputies emphasized the importance of submarines to France and said experts during the past year had been seeking

to perfect plans for the most modern type of this kind of vessel.—*The Washington Post*, 7 December, 1921.

GERMANY

EX-ENEMY SHIPS.—The Reparation Commission in Paris has issued an interesting statement as to the way in which Germany has fulfilled her obligations under Part VIII (Annex III.) of the Treaty of Versailles down to the 1st May, 1921. This relates to the obligation laid upon her by the victors in regard to the handing over of mercantile tonnage. From the statement it would appear that a total of 2,153,407 tons had been handed over. This fleet is made up of:

Passenger vessels	611,327 tons.
Cargo vessels	1,432,191 tons.
Sailing ships	80,140 tons.
Fishing boats	9,749 tons.

If one appreciates the wording of the statement properly, it would seem that this total does not include the many and important vessels which now fly the United States flag, but which were formerly comprised in the German Mercantile Marine. For the vessels with which the statement deals are vessels which have been *surrendered*. The vessels now under the American flag were never surrendered. They took refuge in United States ports on the outbreak of the war in August, 1914, and remained sheltering there till the United States itself became a belligerent. Then it promptly seized all the German tonnage within its jurisdiction. At the Armistice the Americans announced their intention of continuing to hold these ships. This it has done. As the United States were obviously not parties to the Treaty of Versailles it is further apparent that these vessels cannot be dealt with under its provisions. It seems obvious then that the American claim is based upon seizure and continued possession, and accordingly the real diminution of Germany's mercantile fleet is, say, 600,000 tons greater than the figures from Paris would lead us to imagine. An official estimate of the value of the tonnage surrendered is also furnished by the Commission. This is put at 745 millions of gold marks, which would be equivalent to thirty-seven and a quarter millions of British currency.

Not only are the German shipbuilding yards well occupied with work for the purpose of restoring their country to the place on the seas which had been won for it prior to the war, but temporary measures are being taken for showing the commercial flag while the new fleet is in process of making. Owing to the low standard to which the German paper mark has now fallen in the international exchanges, Germany can make a good thing out of running foreign ships which would otherwise be laid up owing to the fact that in consequence of the relatively high rate of their own country's exchange, they cannot be profitably employed under their national flag. Accordingly, many vessels are being sold, or colourably sold, by Swedes to German shipowners. Swedish vessels are being removed to the German register and being managed by German shipowners, who, in addition to certain allowances, receive 10 per cent of the net profit from the working of the ship as compensation for the work of management.—*The Marine Engineer and Naval Architect*, November, 1921.

GERMAN SHIPPING TO THE FAR EAST.—The latest extension of German shipping is a cargo service to the Far East. The Hamburg-America and the Norddeutscher Lloyd are arranging a united service which opens on December 4 with the H. A. L. motor ship *Haveland*. The N. D. L. steamer, *Westphalia*, follows on January 7, 1922. Vessels call at Bremen and Rotterdam, and then proceed to the Straits, Hong Kong, Shanghai, Kobe and Yokohama. The ships employed afford accommodation for a limited num-

ber of passengers.—*Engineering and Industrial Management*, 17 November, 1921.

NORTH GERMAN LLOYD'S NEW OCEAN-GOING FLEET.—In a statement issued to the German press, Vice-President Ehlers of the North German Lloyd Company states that his line is making rapid progress with the rehabilitation of its fleet. At present the company is employing in the Brazil service the *Vegesack* and *Bremerhaven* which were built last year and has recently repurchased from England its former steamers *Westfalen, Holstein, Gotha, Seydlitz, York, Gottingen* and *Hannover*. These steamers are of about 50,000 tons gross.

On October 1 there was launched for the company the steamer *Minden* of 4200 gross tons. She is 360 feet long and has accommodations for 12 cabin passengers. The *Minden* is a coal burner. In order to be able to compare the different motive powers now in use with regard to their safety and profitableness, the company has ordered two sister ships of equal size, one of which will be fitted with steam turbines and the other with Diesel motors. The largest unit building for the line is the steamer *Hindenburg* of 35,000 gross tons which is completing at the Schichau Yards in Danzig. She is a sister ship of the Homeric of the White Star Line.—*Nautical Gazette*, 19 November, 1921.

DIRIGIBLE CONSTRUCTION IN SPAIN.—An arrangement has been reached between the Compania Trans-Atlantic and the Zeppelin Company of Germany for the construction in Spain of two rigid airships, each 250 meters long, 38.8 meters in diameter, and with a gas capacity of 180,000 cubic meters.

An air base is to be established in Spain (between Sevilla and Cadiz) where one shed will be built. A base has also been selected in the Argentine Republic where two sheds—one revolving—will be erected. The manufacture of the sheds will require an estimated time of two years. The sheds themselves can be built in much less time.

A smaller ship of the capacity of 50,000 cubic meters will be used for service between Spain and the Canary Islands, and for the training of pilots.—*Aerial Age Weekly*, 28 November, 1921.

GERMANY'S PAST AND FUTURE SHIP OUTPUT.—In a review of the present position of shipbuilding in Germany, a correspondent of *The Shipbuilder* states that about 73,000 men were employed in German shipyards in 1913. The output that year was about 460,000 gross tons or an average of 6.3 tons per man. In 1919 there were 80,000 men engaged in the construction of merchant vessels, who produced 250,000 gross tons or just over three tons per head. Most of the ships built in that year were small units, requiring more labor per ton than vessels of large tonnage, but the diminution of output as compared with that of pre-war days is obvious. As regards 1920, the output of that year may be estimated at about 320,000 tons with 75,000 men employed or about 4.3 tons per man.

At the present time the cost of construction is about 8000 marks per gross ton, but this is likely to be advanced shortly owing to the increasing cost of material and labor. At a cost per ton of 8000 marks, the government indemnity funds awarded shipowners permit an output of 330,000 gross tons in 1921, 210,000 tons in 1922, 150,000 tons in 1923, 110,000 tons in 1924 and 50,000 tons in 1925. To these totals must be added any ships built for private shipowners apart from the government's program.

In some of the German shipbuilding establishments, the output of the men per head is now as great as it was before the war. At other plants, the output is still materially less, the falling off being as much as 25 to 30 per cent. Moreover, the output of the yards has been considerably cur-

tailed by the adoption of the 48-hour in place of the 57-hour week.—*Nautical Gazette*, 26 November, 1921.

GREAT BRITAIN

NEW WARSHIP CONTRACTS LET.—The contracts for the four capital ships provided for in the naval program of Britain have now been placed by the Admiralty. The orders have been pretty fairly distributed, and the balance has been evenly held between the necessarily conflicting claims of the different steelmaking and shipbuilding districts and the facilities they can provide for the execution of such contracts. True, the Clyde receives orders for three of the new battle-cruisers to the Tyne's one, but the contracts for the armaments of the vessels will provide employment for thousands of men in Sheffield, Manchester, Barrow on the Tyne, and at Woolwich Arsenal.

Names of Successful Bidders.—The hull and machinery of one vessel, as everyone expected, go to Messrs. John Brown & Co., Ltd., of Clydebank and Sheffield. As the experienced builders of H. M. S. *Hood* and many another warship of recent design, high speed, and heavy armament they could not be passed by. The Fairfield Shipbuilding & Engineering Company, Ltd., of Govan, Glasgow, also receive an order for a complete ship, hull and machinery. Then Messrs. William Beardmore & Co., Ltd., have received the contract for the hull of the third battle-cruiser, but the machinery will be built by Messrs. Vickers. The successful Tyneside firm, Messrs. Swan, Hunter & Wigham Richardson, Ltd., has a reputation for merchant shipbuilding which is second to none, but in modern warship construction of the largest type it has yet to win its spurs.

The machinery of this ship has been sub-let to Messrs. Parson Marine Steam Turbine Company, Ltd., of Wallsend. The contracts will mean an expenditure in the Clyde center alone of possibly over £25,000,000, and employment for thousands of shipyard workers for the next three or four years. Each vessel, it may be roughly estimated, will cost about £9,000,000 to complete. At Sheffield, too, the steel contracts will provide work for many hands and "shops," and all round, the orders should give a much-needed fillip to employment in the iron and steel trades of the Kingdom. The designs of the new ships are, of course, secrets of the Admiralty, but naturally they will incorporate all the sea lessons of the war which our navy, above all others, should know best.—*Nautical Gazette*, 19 November, 1921.

AMERICA'S GREAT LEAD.—It would be paying the Americans a poor compliment to attribute their initiative in the matter of naval disarmament purely to altruism. Certain newspapers in this country, which appear to think that a never-ending stream of servile flattery is required to keep our American friends in good humor with us, are already uttering hysterical protests against any "tampering" with the Washington scheme of cutting down the navies of the world. This sort of behavior is decidedly un-British and by no means calculated to raise our prestige across the Atlantic. There are few papers, we venture to affirm, which have striven so consistently as *The Naval and Military Record* to foster amicable relations with the United States. Our efforts in this direction have frequently met with generous recognition from the American Service Press, and we shall therefore not be misunderstood if we try to throw a little fresh light on the genesis and true meaning of the naval proposals laid before the Conference by Mr. Hughes.

The fundamental motive is, without doubt, a sincere desire both to lighten the international burden of armaments and to avert war in the Pacific. It is, indeed, the transparent honesty of its authors which has caused the scheme to be so favorably received in practically every quarter. They offer no one-sided bargain, and demand of others no sacrifice which they are not

prepared to make themselves. It is a square deal in every sense of the word, with all the cards laid on the table—a refreshing contrast to the hole-and-corner methods, the chicancery, and the cynical sophistry which characterized the proceedings at The Hague. But when all this is admitted, the fact remains that the proposals for scaling down the battle fleets, suspending further dreadnought construction, and allotting definite standards of strength for auxiliary craft have been most carefully drafted with an eye to America's own strategical requirements of the future. This does not mean that the scheme is unfair to Great Britain or Japan. On the contrary, it is eminently fair, given certain minor readjustments which will doubtless be suggested by the technical experts who are considering the program.

The British Empire, with its intricate network of sea communications to guard, and its almost complete dependence on seaborne imports of food, may reasonably lay claim to a larger share of such vessels as are best suited to the work of patrolling the ocean highways. In our opinion the British Navy might be twice as strong as the American Navy in cruising ships, and yet have too few to protect the Empire's trade in wartime; and if the navy cannot fulfil that all-important function, it is demonstrably inadequate. Japan, on her part, is raising some objection to the wholesale scrapping of costly warships which are within measurable distance of completion. She wishes to proceed with the *Mutsu*, a 33,800-ton battleship armed with 16-inch guns, which is due to hoist the pennant next month, and is very loath to break up the still larger battleships *Kaga* and *Tosa* and the giant battle-cruisers *Amagi* and *Akagi*, several of which have reached the launching stage and would probably have been afloat by now but for the labor troubles in Japan. It is further pointed out by Japanese critics that the suggested ratio of scrapping would bear more heavily on their country than others. America undertakes to delete 15 vessels out of a total of 33, which is equivalent to 46 per cent, while inviting Japan to discard ten ships out of 20, which means a 50 per cent reduction.

There is even more force in the Japanese argument that her inferior resources for shipbuilding and armament production ought to be taken into account when determining the strength of her permanent fleet. Both Britain and America could add enormously to their naval establishments in the course of a year or two of intensive building, as, in fact, both did during the war; but this would be impossible for Japan. Finally, there is considerable misgiving in Japan as to the effect that a sudden and complete suspension of all naval construction may have on the labor and general political situation, which is none too stable at the moment. Four-fifths of the entire work at present being done in Japanese shipyards is on behalf of the navy, and, if this were withdrawn, the shipbuilding industry would be threatened with ruin. Common justice demands that consideration be paid to the peculiar difficulties which confront Japan in this matter of naval reduction.

No feature of the scheme propounded at Washington has evoked more comment than America's offer to scrap her six battle-cruisers. Nearly every American naval critic has hitherto referred to these ships as being absolutely indispensable, and, although there had been plenty of suggestions for discontinuing work on the six heaviest battleships, it was taken for granted that the battle-cruisers would have to be completed at all costs. What is the explanation of this surprising change in the American attitude? Principally, we think, a desire to give concrete proof of good faith, and a frank recognition that the sacrifice of the battle-cruiser program was a condition precedent of a true "naval holiday."

Had these six ships been retained, Japan would unquestionably have gone on with her four corresponding vessels of the *Amagi* class, and we should probably have decided to complete the four super-*Hoods*. Realizing this, America has taken the bull by the horns and offered to demolish six ships

which would have been the most powerful and valuable units of her future battle fleet. But there was perhaps a third reason for the sacrifice, namely, a growing doubt as to the wisdom of building such huge, costly, and vulnerable vessels at a time when aircraft and submarines are developing remarkable powers of offense.—*Naval and Military Record*, 23 November, 1921.

BUILDING SUSPENDED.—There is a prospect of the fruits of the Washington Conference being garnered at an earlier date than had been anticipated even by the most sanguine optimist. In less than a week of the assembly of the nation's delegates in the capital of the United States, the British Admiralty feel justified in issuing instructions for the suspension of work on the four super-*Hoods*, for which orders were given last month at an estimated cost of £30,000,000. The general public have every reason to rejoice over this fact, but by the many thousands of people interested in the shipbuilding industry the announcement will be received with mixed feelings; and, although the orders for the ships had been allotted to private yards in the North, the employés in the Royal Yards are directly interested in view of the probability of further discharges from the national yards in the near future. How seriously the suspension of the work will affect the shipbuilding industry and kindred trades is indicated by the fact that at the beginning of this month the statement was officially made that it was considered that some 5000 men would be employed in the shipyards, engine works, and steel works during the last two months of this year, and that in the New Year this number would rapidly increase to 25,000 men. The number of firms that would be interested to a greater or less extent in actual building or in providing material would probably be in the neighborhood of 500.—*Naval and Military Record*, 23 November, 1921.

"DURBAN" COMMISSIONED.—The *Durban*, which hoisted the pennant at Devonport on 1st inst. for service with the Fifth Cruiser Squadron on the China Station, where she will be on service by the time the Prince of Wales arrives in the Far East, is the second light cruiser to be completed at Devonport since the Armistice. She was laid down at Messrs. Scott's Shipbuilding and Engineering Works at Greenock as long ago as January, 1918, so that three years and nine months have been occupied in building a class of ship which before the war, to take the case of the Devonport-built *Aurora*, was completed in a little short of two years.

The *Durban* was brought from Greenock to Devonport to be finished in order to give work to the Westcountry establishment, but was not given much attention by the dockyard authorities until the *Raleigh*, a larger and more powerful light cruiser, which also came from a private shipyard on the Clyde to be completed, was placed in commission. According to the current year's estimates, the total cost of the ship is £861,602, excluding armaments and ordnance stores.—*Naval and Military Record*, 9 November, 1921.

THE BURDEN OF ARMAMENTS.—Some very instructive figures relating to the pre-war and present ratios of military expenditure to the total national disbursements have been brought to our notice. In the financial year 1913-14 the appropriation for the navy was 24 per cent, and that for the army 14 per cent of the total expenditure. In the following year the percentage for the army remained constant, but the navy budget rose to 25 per cent. When these figures are compared with the budgets for 1921-22 it will be found, not only that a very large reduction has taken place in military expenditure as a whole, but that the army has now usurped the navy's former place as the most expensive fighting service; for the current army estimates represent 10 per cent of the total expenditure, and the navy estimates only 8 per cent. Eight years ago there were 149,960 officers and men on the navy's pay-roll, and the total personnel vote was £12,227,702. The number borne to-day is 123,700, a reduction of 17 per cent, yet the per-

sonnel vote has risen to £28,350,600, an increase of 132 per cent. In spite of the substantial cut in numbers, the pay-roll is 122 per cent heavier than in 1913, and the vote for victuals and clothing has increased by 157 per cent. The cost per man in 1913-14 was £81 10s. 9d.; to-day it is £229 3s. 9d.—an increase of 181 per cent. Extending the comparison to the shipbuilding programs, we find that the new program authorized in 1913-14 called for five battleships, eight light cruisers, sixteen destroyers, and a number of submarines and auxiliaries; whereas the new program for 1921-22 provides for only four capital ships to replace those becoming absolete.

Turning to the army statistics, a somewhat different picture appears. The strength in 1913-14 was 180,000, and the personnel vote amounted to £24,214,000. At the present time the army has a strength of 341,000, and the personnel vote is £84,161,000. Thus, although there has been an increase in strength of only 89 per cent, the charge for maintenance, pay, etc., has risen by 196 per cent. An arresting item in the army estimates is that which concerns the expense of the War Office and Staff of Commands, etc. Eight years ago this vote was limited to £443,000; to-day it is £4,149,900—an increase of 836 per cent. Studied as a whole the statistics reveal very clearly the enormous cost of maintaining even comparatively moderate armaments under present-day conditions. Twenty shillings spent to-day produce about the same degree of naval or military power that was purchasable in 1913 for eight shillings. The fact that we are now spending more on the army than on the navy is due to a variety of causes which are fairly well known, chief among them being the heavy military commitments left over by the war.—*Naval and Military Record*, 9 November, 1921.

DOCKING OF H. M. S. "HOOD."—An old but interesting problem has come up in connection with the docking of H. M. S. *Hood*. It is understood that as the result of firing trials the plating of the ship has been strained, and it will be necessary for the newest British warship to be repaired as well as re-fitted. The straining of warship structures as a result of the firing of heavy guns came up for serious consideration during the war period, and it is one with which naval architects are quite familiar.—*The Engineer*, 11 November, 1921.

BRITAIN'S OIL POLICY.—A singularly clear and candid exposition of the oil question and its bearing on our relations with the United States was printed lately by *The Times*. It is safe to say that very few members of the public realize how closely this question will affect the outcome of the Washington Conference. Most of us regard the controversy over the ownership or control of the various oilfields as a mere business squabble between rival plutocrats, but in reality it is of far wider significance. The well-informed writer in *The Times* does not hesitate to assert that a complete understanding between America and ourselves on the international aspect of oil production and supply must precede any agreement as to the limitation of armaments. "Indeed," he adds, "it may fairly be advanced that if Great Britain is not prepared to make concessions in this vital question the Conference is likely to break down."

The present position seems to be that the British Government, acting on the urgent representations of the Admiralty, has lent the weight of its influence to bring large tracts of oil-producing territory under the control of syndicates in which British capital predominates. This policy has roused the antagonism of the Standard Oil Company, probably the largest and most influential business combine in the world. Now the Standard Oil people can pull many strings, even at Washington, as we have discovered from the official notes addressed to the British and Dutch governments. They are assiduously fostering the belief that this country is out to corner the world's entire oil resources, and the patent absurdity of the charge has not prevented it from being widely accepted. German and Irish mischief-makers

in the United States are using it as the text of fresh diatribes against perfidious Albion, and the Hearst papers have seized with avidity upon this new pretext for sowing discord between the two countries.—*Naval and Military Record*, 16 November, 1921.

MANNING AND TRAINING PROBLEMS.—So drastic has been the reduction in the personnel of the Royal Navy since the end of the war that the Admiralty are experiencing difficulty in putting into operation in its entirety the new scheme for the training of boys in sea-going ships. The shortage exists not only in the number of schoolmasters available for service afloat, but in the number of petty officers for duty as instructors. It is probable that as the result of the encouragement offered to seamen to qualify for promotion there will in the near future be sufficient petty officers to meet the needs of the fleet.

Whether the schoolmasters' branch will reach the required strength will mainly depend upon the promised concessions in rates of pay and conditions of service which have been promised, but it is evident that these improvements have been decided on none too soon. In the meantime several paragraphs in the scheme promulgated in 1919 are to remain in force and will continue to operate until the necessary number of schoolmasters is available, while with regard to petty officers, the Admiralty directs that until such time as the necessary number is available it shall be left to each commanding officer to decide at his discretion whether the new scheme shall be introduced in its entirety.—*Naval and Military Record*, 9 November, 1921.

TEMPORARY NAVAL OFFICERS.—It is satisfactory to learn from a recent reply to a question in the House of Commons that no temporary officers for combatant duties remain in the Naval Service. There are, of course, a few officers entered on a temporary basis during the war who are not yet demobilized, but in each case there are special and exceptional circumstances which govern their retention. In one category are the officers entered in consequence of a shortage of permanent officers in the medical, dental, and instructor branches, and the whole-time Roman Catholic and Nonconformist chaplains who were formerly employed on a civilian basis. Another category consists of the officers employed with the Inter-Allied Commission of Control in Germany, mainly on interpreting duties, and those employed as interpreters in the Eastern Mediterranean, where there are also a few officers retained on account of their special knowledge of local conditions. Most of the latter, however, will be demobilized shortly or relieved by officers of the Royal Navy. It cannot be too strongly impressed upon the authorities that in view of the great reductions in the fleets and naval establishments—which may be extended somewhat as a result of the Conference now taking place in Washington—and the consequent increase in the numbers of regular officers who are obliged to go on half-pay, often with great hardship to them and their families, every possible check should be placed upon the keeping on of temporary officers, many of whose jobs could, at least, after a short period of study, be taken over by officers of the Royal Navy.—*Army and Navy Gazette*, 19 November, 1921.

THE FLEET AND AIR OBSERVERS.—Upon similar lines to the specialist branches for gunnery, torpedo, navigation and signals, the British Admiralty have decided to make a specialist branch of the Air Observers among naval officers. For the present, eight officers will be selected each half-year. In time, only junior lieutenants of two years and upwards will be selected, as in other specialist branches, but a few commanders and lieutenant-commanders are required, immediately for training. Courses, each of seven months' duration, will begin in May and November in each year, and will include two months' preliminary training at the naval schools in gunnery and signals, and five months at the seaplane training school at Lee-on-Solent.

While under training with the R. A. F. officers will receive the full pay of their naval rank, with extra remuneration for each actual day of ascent, of 3s. in the case of commissioned and subordinate officers, and 1s., 6d. in the case of warrant officers. After qualifying they will be eligible for appointment as observers in aircraft carriers in the Royal Navy, and while actually detailed as trained observers will receive allowances of 4s. and 2s. a day respectively. If qualified in wireless telegraphy, these allowances will be increased to 6s. and 3s. a day. Officers will retain their naval rank and wear naval uniform while under training. On completing the qualifying course they will be rated probationary observers and appointed to fleet carriers for further training. On completing six months, including a course at Leuchars, Fife, they will be eligible for confirmation on the recommendation of the commander-in-chief of the Atlantic fleet.—*Aerial Age Weekly*, 5 December, 1921.

ADMIRALTY AND REQUESTS FOR CHANGES.—As applications are frequently made to the Admiralty to have appointments cancelled, it must be pointed out that officers cannot, as a general rule, be permitted to select or decline appointments. Applications to have an appointment cancelled are not to be made except for urgent reasons, which are to be fully stated in writing. If an officer making such an application is on full pay, his commanding officer, in forwarding it, is to state whether or not he recommends that the application shall be granted. This does not apply to officers on unemployed pay.

Many officers as a matter of principle never decline an appointment at whatever personal or private inconvenience. It is evidently unfair to such officers if others are permitted to do so with the object of avoiding foreign service appointments of an arduous character, etc.

Applications are also received for appointments to particular ships. The board consider that such application for exchange may be forwarded for consideration through the usual channels provided that adequate reasons are given, and that the commanding officers of both ships concerned express their approval of the application.—*Naval and Military Record*, 23 November, 1921.

FLEET COAL SUPPLY.—The Admiralty has invited tenders for the supplies of Welsh coal during 1922. The Admiralty pre-war requirements amounted to about 1,500,000 tons per annum. The requirements for next year are anticipated to be only about one-third that figure, by reason of the development in the use of oil in the navy.—*Engineering*, 18 November, 1921.

IMPERIAL WIRELESS.—With regard to the proposals for the imperial wireless chain, the postmaster-general has stated that the scheme was approved by the government and was endorsed by a committee of the Imperial Conference over which Mr. Churchill presided, and by the conference itself in the following resolution: "It is agreed that His Majesty's government should take steps for the erection of the remaining stations for which they are responsible, as soon as the stations are designed; that the governments of Australia, the Union of South Africa and India, should take similar action so far as necessary, and that the governments of Canada and New Zealand should also co-operate." The above scheme was accepted by the Prime Minister of the Commonwealth subject to giving full freedom of action to Australia to decide the method in which Australia will co-operate. No change in the policy of the government has since taken place. The first two stations in the imperial chain, Leafield and Cairo, will be completed and working by the end of this year, and a commission of experts has been engaged in designing the remaining stations. Their report is expected within a few weeks, and on its receipt the construction of the stations will be proceeded with as quickly as possible.—*Engineering*, 25 November, 1921.

FIRST 20,000-TON LINER WITH DIESEL ENGINES.—The first 20,000-ton motorship will be the new British trade ship, which is being built for exhibition purposes. She is to make an 18 months' tour of the world and is to sail on her first voyage in August, 1923.

According to *Motorship*, three Diesel engines each of 3000 horsepower are to be installed on this trading craft. Through the use of internal combustion motors in place of steam, extra space will be available for exhibits and cabin accommodations. No funnel will be required and coaling will be entirely done away with. Moreover, the propelling machinery will represent the very latest development in marine engineering and will be certain to prove of great interest to visitors at the overseas ports at which the ship is to call.—*Nautical Gazette*, 26 November, 1921.

BRITISH SHIPPING FIRST IN CHINESE TRADE.—For the first time since 1914 statistics of the tonnage entered and cleared from Chinese ports have been published. The total figures were 104,266,695 tons, of which 40,300,000 tons were British, 28,200,000 tons Japanese, 23,600,000 tons Chinese and 4,700,000 tons American. In 1919 the American total was only 2,100,000 tons.—*Nautical Gazette*, 19 November, 1921.

JAPAN

JAPANESE NAVAL CONSTRUCTION.—The fact that Japan as a naval power is now inferior only to ourselves and the United States forms the subject of a great deal of comment both here and across the Atlantic. It has drawn unusual attention to the financial and political aspects of Japanese naval policy, and was undoubtedly one of the main reasons why the American Government convoked the present Conference. At first sight there seems little enough justification for this sudden interest, not to say apprehension, regarding the naval developments which have been taking place in the Far East. Reckoning only such ships as are now in service, the Japanese Navy does not appear to be particularly formidable in comparison with the navies of Great Britain and the United States. Its elevation to the rank it occupies to-day is due much more to fortuitous circumstances than to any efforts put forward by the Japanese themselves. Had not the war intervened, Japan might still be fourth, perhaps even fifth, in order of naval precedence, for her existing fleet is considerably smaller than that which Germany possessed at the outbreak of hostilities. Moreover, the program that France had in hand in 1914 would doubtless have been completed in the normal course of events, in which case the French Navy would now be stronger in battleships than the Japanese. The really significant factor in the situation is not the amount of naval tonnage which Japan has already built, but the amount which she has on order or proposes to build. This is so large that its completion would approximately double her present fighting strength at sea. On October 1 of the current year, the Japanese Navy included only seven completed dreadnought battleships and four battle-cruisers. The corresponding figures were, for the United States, 20 battleships and for Great Britain, 22 battleships and seven battle-cruisers. Therefore against a total of 20 American or 29 British all-big-gun ships, Japan could muster only 11. Had there been no reason to anticipate any drastic alteration in this ratio, the present discussion with regard to Japanese naval policy would be irrelevant and uncalled-for. It is only when we turn to the statistics of tonnage building or authorized that we begin to appreciate the magnitude of Japan's naval preparations. Her avowed purpose—now presumably to be modified—was to create a first-line fleet of two squadrons, one comprising eight battleships and the other eight battle-cruisers—or 16 capital ships in all. Of the vessels already completed, only two were deemed worthy of inclusion in this so-called "eight-eight fleet"; which means that the remaining 14 units have yet to be completed. It will, therefore, be seen that the 11 capital

ships now in commission represent numerically less than half the establishment contemplated, which would ultimately have stood at 25 ships, 16 of which were to be of the largest and most powerful type. The date on which this maximum degree of strength was to be attained was March, 1928. Besides the capital ships enumerated, provision had been made for 12 cruisers, 32 destroyers, 5 gunboats, 18 fleet auxiliaries, and "a certain number" of submarines—all of which were additional to construction voted previous to July, 1920. According to an Admiralty statement in the House of Commons on December 1, 1920, Japan had on hand at that time the balance of an old program due for completion in 1923-24, the residue of which included 11 cruisers and 41 destroyers.

We are not concerned with the political aspect of this great shipbuilding scheme, but some brief comments on the financial burden its execution would have entailed may not be out of place. The following table* shows the credits which have been or were to be voted year by year *for new construction alone*, as distinct from other naval services, during the period covered by the program now in force:

1920-21	£23,189,233
1921-22	27,330,135
1922-23	20,092,565
1923-24	15,473,463
1924-25	10,981,144
1925-26	11,205,479
1926-27	11,369,285
1927-28	11,537,735

This gives a total of £131,179,039 to be spent on new naval tonnage in the space of eight years. It is an imposing sum as it stands, the expenditure of which would strain the resources of a state much wealthier than Japan. Nevertheless, it is already evident that if the program had been carried out in its entirety the above estimate would have had to be revised on the upward scale. It was framed last year on the supposition that the cost of each ship would not exceed a certain figure, but it is notoriously difficult to forecast the trend of naval design even a few years ahead, and what seems an ideal type to-day may have become almost obsolete by to-morrow. The present cost of a capital ship of conventional type is probably about £7,500,000 or £8,000,000. But should anything occur to make still greater dimensions necessary or desirable, the cost per ship must inevitably rise in proportion. There is, indeed, some reason to believe that improvements made recently in the design of certain Japanese ships which were about to be laid down have upset the financial calculations on which the above table was based, and the Press of Japan takes it for granted that the building program would eventually have cost from 20 to 30 per cent more than the original estimate. The difficulty of appraising the annual cost of a given program of naval construction over a long term of years has often been exemplified. Germany, in carrying out her "Flottengesetze," found it impossible to adhere to the yearly instalments originally fixed, and more recently still the United States have been compelled to make a substantial increase in the credits authorized for each and every type of ship included in the three-year Navy Law of 1916.

One striking point about the Japanese naval budget is the extraordinarily large percentage which is absorbed by new construction. This vote alone accounts for 55 per cent of the total navy appropriations in the current year. An analysis of Japan's national income and expenditure shows that this year's vote for *new naval construction* is equivalent to 17.5 per cent of the total revenue from taxation. Clearly therefore, "the burden of armaments" is something more than a phrase to the taxpayers of Japan.

*The figures given were courteously furnished by the Imperial Navy Department, Tokyo.

That so large a share of the navy budget should be available for shipbuilding is due in part to the low cost of other branches of the service compared with foreign navies. Pay, pensions, allowances, victualling, labor charges, etc., are on a considerably lower scale than those prevailing in Europe or the United States. On the other hand, Japan probably has to pay more for building materials, machinery, armor, ordnance, and equipment, so that it is doubtful whether in the long run she gets better value for her naval expenditure than other powers.

Apart from the severe financial strain imposed by the "eight-eight" program, doubts have been cast upon the ability of Japanese industry to cope with so much naval work and complete it within the specified period. To do this would have necessitated an increase of approximately 50 per cent in the present rate of output from the shipyards, engineering shops, armor and ordnance factories. When introducing the new program to the Imperial Diet in July, 1920, the Minister of Marine said that the national building capacity was two capital ships a year. But if the whole of the fourteen new capital ships were to be in service by 1927 it is obvious that production would have had to be accelerated. Long before the Washington Conference met, certain organs of the Japanese Press said openly that the program could not be completed to time-table without enlisting the aid of foreign builders, and it is no secret that inquiries have been made in this country by the Japanese authorities with a view to placing orders for warships. That no such contracts have actually been awarded is attributed to dissatisfaction with the terms quoted. Be that as it may, British industry has already been called upon to supply machinery, armor plate, and ordnance accessories for certain Japanese vessels now under construction. There is a natural reluctance in Japan to let more work go out of the country than is absolutely necessary, especially at a time like the present, when the shipbuilding and kindred industries have been badly hit by the slump in mercantile tonnage. Precise details of the shipbuilding resources now available in Japan are not easy to obtain. It is known, of course, that the government yards at Kure and Yokosuka and the private establishments of Mitsubishi and Kawasaki can undertake "dreadnought" construction, and have, in fact, built capital ships of the largest dimensions. Other private yards, however, may now be in a position to accept such work, thanks to the extensions that were made during the war period. Five such establishments were in process of developing their building facilities on a very large scale when the war came to an end, but it is not certain whether their plans have materialized. If they have it is probable that some, at least, of these yards could now build warships of any displacement. But the building of the hull is only part of the sum of labor represented by the completion of a great fighting ship, and while several of the yards in question may be competent to do this share of the work, it may be doubted whether they would be able to manufacture propelling machinery of such high power as that which is to be installed in the new ships—the battle-cruiser *Amagi*, for instance, is credited with engines of 170,000 shaft horsepower. Nor is it certain that the armor and ordnance plants, in spite of recent developments, could produce sufficient guns and armor plate to equip, say, four capital ships every year. A careful survey of Japanese resources in the light of the latest data obtainable leads the writer to estimate the maximum output of capital ships, complete in every detail, at three ships per annum. As regards smaller naval vessels, there are seven yards which can build and engine cruisers up to 8000 tons. The production of surface torpedo craft could undoubtedly be increased far beyond the present figure if it were deemed necessary to do so. Some noteworthy records in the rapid construction of these craft stand to the credit of Japanese builders, and a group of destroyers which had been completed in a few months went afterwards to the Mediterranean, where the vessels proved equal in every way to the arduous conditions of war service.

It is only during the past six years that Japanese naval opinion has become really impressed with the possibilities of submarine warfare. Since 1915, however, the submarine flotilla has been steadily reinforced, though the process was and still is attended with serious difficulties of a technical character. It was found that the European and American types from which the earlier boats were modelled were not well adapted to the peculiar conditions that govern submarine navigation in Far Eastern waters. Scantlings of abnormal strength are said to be essential in boats intended to operate in those latitudes. A purely Japanese design has been evolved, but reports as to its performance are somewhat conflicting. In particular, trouble is reported to have been experienced with the motors of native construction, and in recent years the tendency has been to rely very largely on foreign manufacturers for submarine engines. As is well known, Vickers, Limited, are now completing an order for several sets of submarine engines to Japanese account; and in August last it was announced that Messrs. Sulzer Bros., of Winterthur, had received a Japanese contract to the value of £1,250,000 for submarine Diesel engines in sets of 4000 brake horsepower each. From all accounts the program of July, 1920, provided for an eventual establishment of eighty "first-line" submarines, ocean-going and coastal types, very few of which have been completed to date. It remains to be seen whether the residue of this program which survives the reductions to be determined at the Washington Conference can be realized without enlisting foreign aid to a much larger extent than is the case at present.

Before leaving the subject of Japan's naval shipbuilding resources it will be well to correct a misapprehension which seems to be prevalent even in naval circles in this country, viz., that the industry in Japan is immune from the labor troubles which impose so serious a handicap on our own efforts in the same direction. Only a few weeks since one of the London newspapers printed an article by a British naval officer, who declared, *inter alia*, that "Japanese shipyard workers never strike." The accuracy of this statement may be judged by the fact that throughout last July and August the two greatest private shipbuilding yards in Japan, the Mitsubishi and the Kawasaki, were forced to remain idle in consequence of a strike involving no less than 40,000 workmen at Kobe alone, 90 per cent of whom were engaged in shipbuilding trades. Further enlightenment on this subject is given by the following extract from a Japanese paper of September 22: "Investigations published by the Furukawa Gomei Kaisha show that uncertainty of employment still continued to prevail during August, and disputes have multiplied since the second half of the year, owing to the spread of labor doctrines, the workers claiming the rights of collective bargaining, the adoption of a factory committee system, etc. During August there were fewer troubles than in the previous month. The number of disputes totalled twenty-five, in which 39,991 laborers were involved. These figures show, as compared with July, a decrease of fourteen in the number of disputes and 6000 of laborers affected. Classifying by industry, the shipbuilding trade suffered most severely, embracing 63 per cent of all the agitations." It will be seen, therefore, that the supposed Japanese advantage in respect of immunity from labor troubles in the shipbuilding world is quite illusory.

At the present moment there are four capital ships on the stocks in Japan. The Kawasaki Yard, Kobe, is building the battleship *Kaga*, and the Mitsubishi Yard, Nagasaki, the battleship *Tosa*. These are sister ships and both were due to take the water in October. Their launch, which has been delayed by the strikes mentioned above, is expected to take place this month—November. According to press reports, their dimensions are: Length, 700 feet; breadth, 100 feet; displacement, 40,600 tons. Their speed is to be 23 or 23½ knots, and they will mount eight or more 16-inch guns. The other two ships being built are the battle-cruisers *Amagi* and *Akagi*.

laid down respectively at the naval arsenals of Yokosuka and Kure in December, 1920, and January, 1921. Both were to have been launched early next year. Their unofficial details are: Length over all, 880 feet; breadth, 103 feet; displacement, 43,500 tons; speed, 33 knots; main armament, eight 16-inch guns. As soon as the slips now occupied by the *Kaga* and the *Tosa* became vacant the keels of two new battle-cruisers, the *Atago* and the *Takao*, were to have been laid thereon. These vessels, which may never be built, are generally described as sisters of the *Amagi*, but they were just as likely to have proved larger and more powerful in every way. The launch early in 1922 of the *Amagi* and *Akagi* would have left the slips at Yokosuka and Kure free for the laying down of the new battleships *Owari* and *Kii*, regarding which no details can be obtained.

We come now to the completed ships of the Japanese Navy. The *Nagato* is not only the largest fighting ship so far built for the Japanese Navy; she is actually the largest battleship in the world at the present time, and now that the American ships of the *Indiana* class are apparently to be scrapped she will probably retain that distinction for a good many years to come. Her sister ship, the *Mutsu*, was completed this month and is now finishing off her trials. The *Nagato* was begun at Kure Dockyard in August, 1917, and did not reach the launching stage till November, 1919. She was formally commissioned in December, 1920, as flagship of the First Fleet, and now flies the flag of Admiral Tochinai. In general features she conforms to what has become the standard type of capital ship, characterized by a main armament of eight heavy guns mounted on the center line—the type which originated with the British *Queen Elizabeth* and *Royal Sovereign* classes, and is now represented in the American Navy by the *Maryland*. The dimensions of the *Nagato* are as follows: Length between perpendiculars, 660 feet 7 inches; breadth, 95 feet; mean draft, 30 feet: normal displacement, 33,800 tons. She is fitted with turbines with reduction gear, developing 48,000 shaft horsepower. The designed speed of 23½ knots was attained with ease on the steam trials. Very heavy armor and special underwater protection has been worked into this ship, but details as to the thickness of plating, etc., are carefully guarded. Such views and drawings as have appeared do not indicate the presence of a bulge. Eight 16-inch 45-caliber guns constitute the main armament. The 16-inch gun discharges a projectile of 2190 pounds with a muzzle velocity of 2800 foot-seconds, and the nominal figure of penetration at a range of 12,000 yards is 12 inches of hardened steel. The first Japanese gun of this caliber was built at the Muroran steel works, the breech mechanism being made at Kure arsenal. It is said to have proved a most successful weapon. The adoption of 16-inch guns by the Japanese Navy was due to the initiative of Admiral Baron Kato, the present Minister of Marine—now representing his country at the Washington Conference—who is strongly in favor of big calibers. It is interesting to note that a full broadside from the main battery of the *Nagato* would weigh 17,520 pounds, the corresponding figures for the *Maryland* being 16,800 pounds and for the *Queen Elizabeth* or the *Hood* 15,360 pounds. The *Nagato* thus fires the heaviest broadside of any warship completed up to the present date. She carries in addition twenty 5.5-inch 82-pounder quick-firing guns, mounted in casemates on the upper and forecastle decks; three or four anti-aircraft guns, and eight torpedo tubes, some of the latter being, it is said, placed above the water line. Externally, the most arresting feature of this magnificent battleship is her foremast, which consists of a central trunk of large diameter supported by six struts. An electric lift working within the main trunk affords rapid access to the fire control station at the masthead. This heptapodal structure was built as the result of experiments which were made to ascertain the form of mast that would give the greatest rigidity and also offer the strongest resistance to shell attack.

The battleship *Ise* and her sister ship, *Huiga*, belong to the 1914 program, both being laid down in May of the following year. They are comparable in fighting power with their American contemporaries of the *New Mexico* class. The leading dimensions are: Length between perpendiculars, 640 feet; breadth, 94 feet; extreme draft, 28 feet 4 inches; normal displacement, 31,260 tons. Turbine machinery of 45,000 shaft horsepower is installed, the designed speed being 23 knots. The water line, the main artillery positions, and other vital parts are protected by armor 12 inches thick, but the armor decks appear to be less substantial than is now deemed desirable in modern capital ships. As these vessels were not begun till nearly ten months after the outbreak of war, it is to be assumed that special attention was paid to their defence against under-water attack. The main armament comprises twelve 14-inch. 45-caliber guns paired in turrets on the center line, two being placed forward, two amidships, and two at the stern. Twenty 5.5-inch quick-firing guns are mounted, mostly in upper-deck casemates, and there are four anti-aircraft guns and six submerged torpedo tubes. These vessels are slightly improved versions of the *Fuso* and *Yamashiro*, which were laid down respectively in 1912 and 1913, and the dimensions are very similar, except that the *Fuso* and her sister are 10 feet shorter and displace only 30,600 tons. Moreover, the speed is only 22 or 22.5 knots. The main armament is the same, but the amidship turrets are disposed on a different system. The armor protection is practically identical with that of the *Ise*.

Although she belongs to a type which is already obsolescent, the battleship *Settsu* is of interest as representing the first purely Japanese conception of an all-big-gun capital ship. Her keel was laid at Kure Dockyard in April, 1909, and she came into service some three years later. She is 533 feet in length over all, 84 feet 2 inches in breadth, and displaces 21,420 tons. Curtis turbines of 25,000 shaft horsepower give her a speed of 20.5 knots. Good protection is afforded to the vital parts by 11-inch and 12-inch armor and several strong decks. The main armament is twelve 12-inch guns, those in the forward and after turrets being 50 calibers long, while the remaining eight are 45 calibers in length. The disposition of the turrets is such that only eight guns will bear on either beam, and thus the full benefit of the powerful armament is not obtained. Originally there was a sister ship, the *Kawachi*, but she was completely destroyed in July, 1918, by an internal explosion.

In proportion to its strength in armored ships the Japanese Navy is well supplied with light cruisers. Two of those authorized under the current program are to be ships of more than 7000 tons. Other light cruisers being built or completed are the *Yura*, *Isudzu*, *Nagara*, *Natori*, and *Kiso*, while four ships of the same general type—*Kuma*, *Tama*, *Oh-i*, and *Kitakami*—have been completed during the past twelve months. All the vessels named are practically uniform in dimensions, displacing from 5500 to 5780 tons, with a speed of 33 to 33.5 knots, and an armament of seven 5.5-inch guns. It is believed that they burn oil fuel only, a system which has not yet been extended to the heavier vessels of the Japanese Navy, owing to the difficulty of securing a supply of this fuel adequate for all emergencies. The *Tatsuta* and *Tenryu*, completed during 1919, have many features in common with the British *Arethusa* class, to which, perhaps, they owed their design. They are 400 feet in length, with a beam of 40 feet 9 inches, and displace 3500 tons. Their speed is 31 knots, and they were the first large Japanese vessels of war to burn oil only. A light armament of four 5.5-inch guns is carried, together with six torpedo tubes on triple-deck carriages. The *Hirado* and her sisters, *Yahagi* and *Chikuma*, were laid down in 1910. In their case a not unsuccessful attempt was made to combine good speed, an extensive radius of action, and a powerful armament on a displacement of 4950 tons. The principal details are as follows: Length over all, 475 feet; breadth, 46 feet 6 inches; machinery, turbines of 22,500 shaft horsepower

for a maximum speed of 26 knots—exceeded on trial; armament, eight 6-inch 50-caliber guns and three torpedo tubes. All three ships performed splendid service in the Great War, steaming many thousands of miles without experiencing any engine-room troubles.

Japanese destroyers are of two types—first-class boats, *i. e.*, above 1000 tons, and second-class boats, *i. e.*, below 1000 tons. It has been customary for some time past to provide for both types in every annual program. The latest first-class boats approximate in size and armament to our flotilla leaders. They displace from 1300 to 1400 tons, have a designed speed of 34 knots, and mount three or four 4.7-inch guns, with six 21-inch torpedo tubes. To this group belong the seven vessels of the *Minekaze* class, and also the *Tanikaze* and *Kawakaze*. The *Amatsukaze* and her three sisters, launched in 1916, were the first of the really modern type of first-class destroyers. They displace 1227 tons, and have touched 35 knots in service. The armament consists of four 4.7-inch guns and six 18-inch torpedo tubes. The *Momo* class—ten boats in all—may be taken as typical of the new second-class type: Displacement, 835 tons; speed, 31.5 knots; armament, three 4.7-inch guns and six torpedo tubes.

Reliable details of modern Japanese submarines are difficult to obtain, for in this respect the naval authorities follow the example of other powers in observing strict reticence. There is, however, reason to believe that the underwater vessels now constructing in Japan will be at least equal in size, sea endurance, and armament to the largest submarines building abroad. A special interest attaches to submarine No. 19, for this boat is—or was until quite recently—the largest submarine in the Japanese Navy, and was also the first ocean-going boat of purely native design. She displaces 890 tons in surface trim and 1200 tons when submerged. The surface speed is 16 knots. Five torpedo tubes are mounted, two of which are in the bows, one in the stern, and two above water on each side of the superstructure. The nominal sea endurance of No. 19 is 6500 sea miles, but the actual cruising radius is probably well above that figure. No 26 is one of the latest boats, having been completed for service early in the present year. Her displacement when submerged is about 1000 tons, and her speed on the surface 16.5 to 17 knots. With two-thirds of her maximum fuel supply on board she can travel a distance of 7500 sea miles. The torpedo armament is limited to four tubes, but a quick-firing gun is mounted on the deck—3-inch in some boats of this series, 4.7-inch in others. In the later submarines now in hand an attempt has been made to increase the radius of action very considerably, for it is recognized that cruising endurance is of the utmost importance in submarines designed for operations in the Pacific. In future, it is said, the Japanese naval authorities will concentrate on two distinct types: (1) Submersible cruisers of good speed, mounting a powerful gun and torpedo armament, and in some cases equipped for mine-laying; and (2) smaller ocean-going vessels, not exceeding 1000 tons, of 17 to 18 knots speed, and carrying a lighter armament. According to one account, "the purely coastal type will not be perpetuated, for experience has shown that it is false economy to construct diminutive submarines when the addition of a couple of hundred tons in displacement endows a boat with good sea-going qualities and a far higher degree of all-round fighting value." The big *versus* little ship controversy has seemingly spread to Japan, for the naval authorities have been criticised by a section of the press for continuing to build heavy armored ships instead of devoting the equivalent in money and labor to the construction of a multitude of submarines. Nevertheless, the official policy, as explained by the Minister of Marine nearly two years ago, remains unaltered. Speaking in the Imperial Diet, Admiral Kato said: "The more we study the lessons of the war, the stronger does our conviction grow that the last word in naval warfare rests with the big ship and the big gun."—*The Engineer*, 25 November, 1921.

JAPAN AND NAVAL BALANCE.—While there is no change in the note of general approval which has been accorded to Mr. Hughes's proposal as affording evidence of America's sincerity, and while it is everywhere conceded that Japan will be second to none in advocating a drastic limitation of armaments, the belief that Japan should put forward a demand for a fairer balance of naval power is daily growing more conspicuous in comments expressed on the Conference.

The newspaper *Kokumin Shimbun* voices the opinion, which is held in many quarters, that Japan would be justified in insisting on the retention of her fleet in the ratio of 70 per cent to that of the American Navy, considering the needs of national defence and the industrial capacities as well as geographical conditions of the two Powers.—*Naval and Military Record*, 23 November, 1921.

JAPANESE AERIAL NOTES.—Japanese newspapers report that the Army Balloon Corps will participate in the maneuvers with the Imperial Guards Division at Suson near Mt. Fuji. The model *R* captive balloon will be used for observation purposes. Five officers of the Balloon Corps and several additional observation officers will take part.

Ten civilian aviation students at the Army Flight School at Tokorozawa graduated August 31. This is the first civilian class at Tokorozawa, but it is expected that these classes will be continued regularly in the future.

A small, non-rigid type airship was recently purchased by the Japanese Government from the Vickers Co., London, according to the Japanese magazine *Aviation*. The airship performed its final test of four hours' continuous flight successfully, only thirty men being required to handle it, and it ascended and descended very readily. The airship is described as having one "ship" in the center, capacity five men, and with a speed of over 50 m. p. h.

The graduation flight of the Naval Air School at Yokosuka took place on July 10. The course was from Oppama (near Yokosuka) to Shinmaiko and return, six graduates taking part. Only one machine reached the latter place, the other planes being forced to descend into the sea. Bad weather conditions prevented this one plane from attempting the return journey.—*Aviation*, 21 November, 1921.

JAPANESE AVIATION.—It appears that Japan is sparing no efforts of expense to building up a great military and civil air force. From England representatives of Messrs. Short Brothers and from the Sopwith Aviation Company have gone to the East to superintend the building of British-designed machines. In addition, a number of R. A. F. officers have gone to Japan to organize the Japanese naval air service. Japan has enrolled some of the leading British designers and engineers. Shipbuilding firms have acquired foreign licenses for the manufacture of naval aircraft and aeronautical engines, and several European firms have established branches in Japan. In addition, military and naval deputations from the East have been for some time inspecting factories and machines in Great Britain, and orders for British, French and Italian machines have been placed with various firms.—*Aerial Age Weekly*, 28 November, 1921.

N. Y. K. ADDING TO FLEET.—The plan to construct a new mercantile fleet amounting to 500,000 tons proposed by the Nippon Yusen Kaisha during the President Kondo's tenure of office, which has been suspended since the orders for the construction of 150,000 tons were placed with the Yokohama Dockyard, is reported about to be resumed.—*Nautical Gazette*, 26 November, 1921.

UNITED STATES

NAVY DEPARTMENT—BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—DEGREE OF COMPLETION, AS REPORTED NOVEMBER 30, 1921

Type, number and name	Contractor	Per cent of completion			
		Dec. 1, 1921		Nov. 1, 1921	
		Total	On ship	Total	On ship
Battleships (BB)					
45 Colorado	New York S. B. Cpn.	84.9	83.8	83.0	81.6
47 Washington	New York S. B. Cpn.	69.8	63.6	69.8	63.6
48 West Virginia	Newport News S. B. & D. D. Co.	65.7	59.3	64.0	57.3
49 South Dakota	New York Navy Yard	36.5	29.5	35.2	27.7
50 Indiana	New York Navy Yard	33.9	26.3	33.2	25.1
51 Montana	Mare Island Navy Yard	27.6	19.	27.6	19.0
52 North Carolina	Norfolk Navy Yard	36.7	27.1	36.7	27.1
53 Iowa	Newport News S. B. & D. D. Co.	30.7	25.8	29.9	25.5
54 Massachusetts	Beth. S. B. Cpn. (Fore River)	11.0	4.3	10.4	3.9
Battle Cruisers (CC)					
1 Lexington	Beth. S. B. Cpn. (Fore River)	28.8	19.3	26.7	17.8
2 Constellation	Newport News S. B. & D. D. Co.	17.1	15.0	15.5	13.7
3 Saratoga	New York S. B. Cpn.	31.0	23.6	29.4	22.2
4 Ranger	Newport News S. B. & D. D. Co.	3.5	1.3	2.9	1.2
5 Constitution	Philadelphia Navy Yard	12.3	7.3	11.7	6.8
6 United States	Philadelphia Navy Yard	11.5	6.5	11.1	6.2
Scout Cruisers (Light Cruisers CL)					
4 Omaha	Todd D. D. & Const. Cpn.	98.4	91.7	96.8	89.6
5 Milwaukee	Todd D. D. & Const. Cpn.	93.6	86.0	93.4	86.0
6 Cincinnati	Todd D. D. & Const. Cpn.	87.4	81.0	87.4	80.8
7 Raleigh	Beth. S. B. Cpn. (Fore River)	63.7	45.6	63.7	45.6
8 Detroit	Beth. S. B. Cpn. (Fore River)	74.4	58.1	71.6	54.1
9 Richmond	Wm. Cramp & Sons Co.	81.	73.	78.	70.
10 Concord	Wm. Cramp & Sons Co.	74.	65.	71.	60.
11 Trenton	Wm. Cramp & Sons Co.	53.	40.	52.	39.
12 Marblehead	Wm. Cramp & Sons Co.	47.	33.	47.	33.
13 Memphis	Wm. Cramp & Sons Co.	40.	26.	40.	26.
Auxiliaries					
Repair Ship No. 1, Medusa (AR 1)	Puget Sound Navy Yard	72.5	60.9	70.6	56.7
Dest. Tender No. 3, Dobbin (AD 3)	Philadelphia Navy Yard	66.6	66.3	66.4	66.1
Dest. Tender No. 4, Whitney (AD 4)	Boston Navy Yard	41.3	35.0	36.8	33.3
Sub. Tender No. 3, Holland (AS 3)	Puget Sound Navy Yard	21.5	5.5	21.5	5.5
Aircraft Tender, Wright (AZ 1)	Tietjen & Lang	99.3	.....	96.	....
Patrol Vessels					
Gunboat No. 22, Tulsa (PG 22)	Charleston Navy Yard	71.2	56.6	71.1	55.7
Destroyers					
338 Wasmuth	Mare Island Navy Yard	99.9	99.9	99.7	99.7
339 Trever	Mare Island Navy Yard	98.0	98.0	97.7	97.7
340 Perry	Mare Island Navy Yard	82.7	82.2	79.5	78.8
341 Decatur	Mare Island Navy Yard	79.5	79.0	73.7	73.0

Authorized but not under construction or contract: (1) Transport No. 2.

Destroyers authorized but not under construction or contract: (12) Nos. 348 to 359 inclusive.

There are 37 submarines and 4 fleet submarines under construction.

There are 1 submarine and 6 fleet submarines authorized but not under construction or contract.

LIMITATION OF ARMAMENTS.—The Conference on the Limitation of Armaments was opened on November 12 by President Harding, who delivered an address. The Secretary of State, Mr. Hughes, was made presiding officer and, following an address, gave details of the American proposal as to a reduction or limitation of armaments.

On Tuesday Great Britain and Japan accepted, in principle, the proposal made by Mr. Hughes.

Secretary Hughes at the close of the meeting on Monday gave out the following statement:

"The first meeting of the committee on limitation of armament was held in the Pan-American Building at 4 p. m.

"There were present the delegates of the United States of America, the British Empire, France, Italy, and Japan, with a secretary for each delegation, and the secretary-general of the conference, who was chosen secretary of the committee.

"A sub-committee composed of one technical naval adviser for each of the five powers was constituted to take under immediate advisement the questions raised by the proposal of the United States for a limitation of naval armaments and to report to the committee from time to time the progress of their deliberations. The sub-committee is composed of the following: Colonel Roosevelt, Admiral Beatty, Vice Admiral De Bon, Vice Admiral Acton, and Vice Admiral Kato, with full power of substitution for each adviser. At the suggestion of Mr. Balfour it was agreed that Colonel Roosevelt should act as chairman of this sub-committee.

"The committee adjourned to meet at the call of the chairman."

The following sub-committees were appointed by the American delegation in connection with the agenda of the conference:

Executive committee—Mr. Sutherland, chairman *ex officio;* Mrs. Eleanor Franklin Egan, secretary; Undersecretary of State Fletcher, Samuel Gompers, Secretary Hoover, Assistant Secretary Roosevelt, former Senator Willard Saulsbury, of Delaware, and W. Boyce Thompson, of New York.

Land armament—General Pershing, chairman; Charles S. Barrett, Mrs. Charles Sumner Bird, Walter George Smith, Representative Stephen G. Porter, Assistant Secretary Wainwright, of the War Department, and John L. Lewis.

Pacific and Far Eastern questions—Stephen G. Porter, chairman; Mrs. Katherine Phillips Edson, Mr. Gompers, Mr. Saulsbury, Harold M. Sewell, Mr. Smith, and Mr. Wainwright.

Naval armament—Rear Admiral Rodgers, chairman; Governor John M. Parker, of Louisiana; Mr. Sewell, Mr. Smith, Carmi A. Thompson, Mr. Wainwright, and Mrs. Thomas G. Winter.

New weapons of warfare—Carmi A. Thompson, chairman; Mrs. Edson, Mr. Lewis, Governor Parker, General Pershing, Admiral Rodgers, and Mr. Roosevelt.

General information—William Boyce Thompson, chairman; Mr. Barrett, Mrs. Bird, Secretary Hoover, Mr. Lewis, Governor Parker, and Mrs. Winter.

The proposal of the United States for a limitation of naval armaments follows:

The United States proposes the following plan for a limitation of the naval armaments of the conferring nations. The United States believes that this plan safely guards the interests of all concerned:

In working out this proposal, the United States has been guided by four general principles:

(a) The elimination of all capital ship-building programs, either actual or projected.

(b) Further reduction through scrapping certain of the older ships.

(c) That regard should be had to the existing naval strength of the conferring powers.

(d) The use of capital ship tonnage as the measurement of strength for navies and a proportionate allowance of auxiliary combatant craft prescribed.

Proposal for a limitation of naval armaments:

CAPITAL SHIPS

UNITED STATES

1. The United States to scrap all new capital ships now under construction and on their way to completion. This includes six battle cruisers and seven battleships on the ways and building and two battleships launched.

(*Note*—Paragraph 1 involves a reduction of 15 new capital ships under construction, with a total tonnage when completed of 618,000 tons. Total amount of money already spent on 15 capital ships, $332,000,000.)

2. The United States to scrap all battleships up to, but not including, the *Delaware* and *North Dakota*.

(*Note*.—The number of old battleships scrapped under paragraph 2 is 15; their total tonnage is 227,740 tons. The grand total of capital ships to be scrapped is 30, aggregating 845,740 tons.)

GREAT BRITAIN

3. Great Britain to stop further construction on the four new *Hoods*.

(*Note*.—Paragraph 3 involves a reduction of four new capital ships not yet laid down, but upon which money has been spent, with a total tonnage when completed of 172,000 tons.)

4. In addition to the four *Hoods*, Great Britain to scrap her pre-dreadnoughts, second line battleships and first line battleships up to but not including, the *King George V* class.

(*Note*.—Paragraph 4 involves the disposition of 19 capital ships, certain of which have already been scrapped, with a tonnage reduction of 411,375 tons. The grand total tonnage of ships scrapped under this agreement will be 583,375 tons.)

JAPAN

5. Japan to abandon her program of ships not yet laid down, namely: The *Kii Owari*, No. 7, No. 8, battleships, and Nos. 5, 6, 7 and 8, battle-cruisers.

(*Note*.—Paragraph 5 does not involve the stopping of construction on any ship upon which construction has begun.)

6. Japan to scrap three battleships: The *Mutsu*, launched; the *Tosa* and *Kaga*, building, and four battle-cruisers, the *Amagi* and *Akagi*, building, and the *Atago* and *Takao*, not yet laid down, but for which certain material has been assembled.

(*Note*.—Paragraph 6 involves a reduction of seven new capital ships under construction, with a total tonnage when completed of 288,100 tons.)

7. Japan to scrap all pre-dreadnoughts and capital ships of the second line. This to include the scrapping of all ships up to, but not including, the *Settsu*.

(*Note*.—Paragraph 7 involves the scrapping of ten older ships with a total tonnage of 159,828 tons. The grand total reduction of tonnage on vessels existing, laid down, or for which material has been assembled is 448,928 tons.

FRANCE AND ITALY

8. In view of certain extraordinary conditions due to the World War affecting the existing strength of the navies of France and Italy, the United

States does not consider necessary the discussion at this stage of the proceedings of the tonnage allowance of these nations, but proposes it be reserved for the later consideration of the conference.

OTHER NEW CONSTRUCTION

9. No other new capital ships shall be constructed during the period of this agreement except replacement tonnage as provided hereinafter.

10. If the terms of this proposal are agreed to, then the United States, Great Britain and Japan agree that their navies, three months after the making of this agreement, shall consist of the following capital ships:

LIST OF CAPITAL SHIPS

UNITED STATES

Maryland, California, Tennessee, Idaho, Mississippi, New Mexico, Arizona, Pennsylvania, Oklahoma, Nevada, Texas, New York, Arkansas, Wyoming, Utah, Florida, North Dakota and *Delaware;* total, 18; total tonnage, 500,650.

GREAT BRITAIN

Royal Sovereign, Royal Oak, Resolution, Ramillies, Revenge, Queen Elizabeth, Warspite, Valiant, Barham, Malaya, Benbow, Emperor of India, Iron Duke, Marlborough, Erin, King George V, Centurion, Ajax, Hood, Renown, Repulse and Tiger; total, 22; total tonnage, 604,450.

JAPAN

Nagato, Hiuga, Ise, Yamashiro, Fu-So, Settsu, Kirishima, Haruna, Hi-Yei and *Kongo;* total, 10; total tonnage, 299,700.

DISPOSITION OF OLD AND NEW CONSTRUCTION

11. Capital ships shall be disposed of in accordance with methods to be agreed upon.

REPLACEMENTS

12. (a) The tonnage basis for capital ship replacement under this proposal to be as follows:

United States, 500,000 tons.

Great Britain, 500,000 tons.

Japan, 300,000 tons.

(b) Capital ships 20 years from date of completion may be replaced by new capital ship construction, but the keels of such new construction shall not be laid until the tonnage which it is to replace is 17 years of age from date of completion. Provided, however, that the first replacement tonnage shall not be laid down until 10 years from the date of the signing of this agreement.

(c) The scrapping of capital ships replaced by new construction shall be undertaken not later than the date of completion of the new construction, and shall be completed within three months of the date of completion of new construction, or, if the date of completion of new construction be delayed, then within four years of the laying of the keels of such new construction.

(d) No capital ships shall be laid down during the term of this agreement whose tonnage displacement exceeds 35,000 tons.

(e) The same rules for determining tonnage of capital ships shall apply to the ships of each of the powers party to this agreement.

(f) Each of the powers party to this agreement agrees to inform promptly all the other powers party to this agreement concerning:
(1) The names of the capital ships to be replaced by new construction.
(2) The date of authorization of replacement tonnage.
(3) The dates of laying the keels of replacement tonnage.
(4) The displacement tonnage of each new ship to be laid down.
(5) The actual date of completion of each new ship.
(6) The fact and date of the scrapping of ships replaced.
(g) No fabricated parts of capital ships, including parts of hulls, engines and ordnance, shall be constructed previous to the date of authorization of replacement tonnage. A list of such parts will be furnished all powers party to this agreement.
(h) In case of the loss or accidental destruction of capital ships, they may be replaced by new capital ship construction in conformity with the foregoing rules.

AUXILIARY COMBATANT CRAFT

13. In treating this subject auxiliary combatant craft have been divided into three classes:
(a) Auxiliary surface combatant craft.
(b) Submarines.
(c) Airplane carriers and aircraft.
14. The term auxiliary surface combatant craft includes cruisers (exclusive of battle-cruisers), flotilla leaders, destroyers, and all other surface types except those specifically exempted in the following paragraph:
15. Existing monitors, unarmored surface craft as specified in paragraph 16, under 3000 tons, fuel ships, supply ships, tenders, repair ships, tugs, mine-sweepers and vessels readily convertible from merchant vessels are exempt from the terms of this agreement.
16. No new auxiliary combatant craft may be built exempt from this agreement regarding limitation of naval armaments that exceed 3000 tons displacement and 15 knots speed, and carry more than 4-5 inch guns.
17. It is proposed that the total tonnage of cruisers, flotilla leaders and destroyers allowed each power shall be as follows:
For the United States, 450,000 tons.
For Great Britain, 450,000 tons.
For Japan, 270,000 tons.
Provided, however, that no power party to this agreement whose total tonnage in auxiliary surface combatant craft on November 11, 1921, exceeds the prescribed tonnage shall be required to scrap such excess tonnage until replacements begin, at which time the total tonnage of auxiliary combatant craft for each nation shall be reduced to the prescribed allowance as herein stated.

LIMITATION OF NEW CONSTRUCTION

18. (A) All auxiliary surface combatant craft whose keels have been laid down by November 11, 1921, may be carried to completion.
(B) No new construction in auxiliary surface combatant craft except replacement tonnage, as provided hereinafter shall be laid down during the period of this agreement, provided, however, that such nations as have not reached the auxiliary surface combatant craft tonnage allowances hereinbefore stated may construct tonnage up to the limit of their allowance.

SCRAPPING OF OLD CONSTRUCTION

19. (A) Auxiliary surface combatant craft shall be scrapped in accordance with methods to be agreed upon.
(B) Submarines.

20. It is proposed that the total tonnage of submarines allowed each power shall be as follows:

For the United States, 90,000 tons.

For Great Britain, 90,000 tons.

For Japan, 54,000 tons.

Provided, however, that no power party to this agreement whose total tonnage in submarines on November 11, 1921, exceeds the prescribed tonnage shall be required to scrap such excess tonnage until replacements begin, at which time the total tonnage of submarines for each nation shall be reduced to the prescribed allowance as herein stated.

LIMITATION OF NEW CONSTRUCTION

21. (A) All submarines whose keels have been laid down by November 11, 1921, may be carried to completion.

(B) No new submarine tonnage except replacement tonnage as provided hereinafter shall be laid down during the period of this agreement, provided, however, that such nations as have not reached the submarine tonnage allowance hereinbefore stated may construct tonnage up to the limit of their allowance.

SCRAPPING OF OLD CONSTRUCTION

22. Submarines shall be scrapped in accordance with methods to be agreed upon.

(C)—AIRPLANE CARRIERS AND AIRCRAFT

23. It is proposed that the total tonnage of airplane carriers allowed each power shall be as follows: United States, 80,000 tons; Great Britain, 80,000 tons; Japan, 48,000 tons.

Provided, however, that no power party to this agreement whose total tonnage in airplane carriers on November 11, 1921, exceeds the prescribed tonnage shall be required to scrap such excess tonnage until replacements begin, at which time the total tonnage of airplane carriers for each nation shall be reduced to the prescribed allowance as herein stated.

LIMITATION OF NEW CONSTRUCTION, AIRPLANE CARRIERS

24. (a) All airplane carriers whose keels have been laid down by November 11, 1921, may be carried to completion.

(b) No new airplane carrier tonnage except replacement tonnage as provided herein shall be laid down during the period of this agreement. provided, however, that such nations as have not reached the airplane carrier tonnage hereinbefore stated may construct tonnage up to the limit of their allowance.

SCRAPPING OF OLD CONSTRUCTION.

25. Airplane carriers shall be scrapped in accordance with methods to be agreed upon.

AUXILIARY COMBAT CRAFT, REPLACEMENTS

26. (a) Cruisers 17 years of age from date of completion may be replaced by new construction. The keels for such new construction shall not be laid until the tonnage it is intended to replace is 15 years of age from date of completion.

(b) Destroyers and flotilla leaders 12 years of age from date of completion may be replaced by new construction. The keels of such new construction shall not be laid until the tonnage it is intended to replace is 11 years of age from date of completion.

(c) Submarines 12 years of age from date of completion may be replaced by new submarine construction, but the keels of such new construction shall not be laid until the tonnage which the new tonnage is to replace is 11 years of age from date of completion.

(d) Airplane carriers 20 years of age from date of completion may be replaced by new airplane carrier construction, but the keels of such new construction shall not be laid until the tonnage which it is to replace is 17 years of age from date of completion.

(e) No surface vessels carrying guns of caliber greater than 8 inches shall be laid down as replacement tonnage for auxiliary combatant surface craft.

(f) The same rules for determining tonnage of auxiliary combatant craft shall apply to the ships of each of the powers party to this agreement.

(g) The scrapping of ships replaced by new construction shall be undertaken not later than the date of completion of the new construction and shall be completed within three months of the date of completion of the new construction, or, if the completion of new tonnage is delayed, then within four years of the laying of the keels of such new construction.

(h) Each of the powers party to this agreement agrees to inform all the other parties to this agreement concerning:

(1) The names or numbers of the ships to be replaced by new construction.

(2) The date of authorization of replacement tonnage.

(3) The dates of laying the keels of replacement tonnage.

(4) The displacement tonnage of each new ship to be laid down.

(5) The actual date of completion of each new ship.

(6) The fact and date of the scrapping of ships replaced.

(i) No fabricated parts of auxiliary combatant craft, including parts of hulls, engines and ordnance, will be constructed previous to the date of authorization of replacement tonnage. A list of such parts will be furnished all powers party to this agreement.

(j) In cases of the loss or accidental destruction of ships of this class they may be replaced by new construction.

AIRCRAFT

27. The limitation of naval aircraft is not proposed.

(*Note.*—Owing to the fact that naval aircraft may be readily adapted from special types of commercial aircraft, it is not considered practicable to prescribe limits for naval aircraft.)

GENERAL RESTRICTION ON TRANSFER OF COMBATANT VESSELS OF ALL CLASSES

28. The powers party to this agreement bind themselves not to dispose of combatant vessels of any class in such a manner that they later may become combatant vessels in another navy. They bind themselves further not to acquire combatant vessels from any foreign source.

29. No capital ship tonnage nor auxiliary combatant craft tonnage for foreign account shall be constructed within the jurisdiction of any one of the powers party to this agreement during the term of this agreement.

MERCHANT MARINE

30. As the importance of the merchant marine is in inverse ratio to the size of naval armaments, regulations must be provided to govern its conversion features for war purposes.—*Army and Navy Register,* 19 November, 1921.

ARMY AND NAVY TRANSPORT.—It is now practically certain that President Harding shortly will issue an order discontinuing the army and navy transport services across the Pacific, and will direct that this traffic be

turned over by the government to commercial lines. The Shipping Board has submitted to the White House information on the cost of these services, and it is understood that the President will follow the recommendations of the Board. This will automatically cancel the previous request of the War Department for the transfer of four of the new 502 combination ships to the army.—*Nautical Gazette*, 26 November, 1921.

PANAMA CANAL EARNINGS.—For the fiscal year ending June 30, 1921, the gross earnings of the Panama Canal amounted to $12,040,116.70 as compared with $8,935,871.57 in the fiscal year of 1919-20, an increase of $3,104,245.13. The cost of operation and management for the year of 1919-20 amounted to $9,328,300.14. Without making any allowance for depreciation of plant or for interest charges on the capital invested, which amounted to $368,543,271.95 on June 30 last, the Canal made a profit in the last fiscal year of $2,711,816.56. Since the opening of the Canal the excess of revenues over expenses has amounted to $480,724.95.—*The Nautical Gazette*, 5 November, 1921.

LARGER DIESEL ENGINED SHIPS.—On June 30 last there were 145 full-powered Diesel engined ships of over 2000 gross tons. These were divided among the following flags:

	Number	Gross tons
British	34	217,104
Danish	21	121,580
Swedish	20	91,681
American	28	86,457
Norwegian	21	85,032
Italian	6	26,449
All other	15	63,467

In addition to these large motor ships there were 553 small Diesel-engined vessels, aggregating 210,118 gross tons. Of this number, 59 were American vessels, totaling 27,521 gross tons.

The United States leads in sailing ships equipped with Diesel or semi-Diesel engines for auxiliary power. It owns 61 such ships, aggregating 60,103 gross tons.—*Nautical Gazette*, 19 November, 1921.

BOARD OFFERS SHIPS AT WORLD MARKET PRICES.—In accordance with instructions issued by Chairman Lasker, the Shipping Board is advertising for bids on the transport *Northern Pacific* and 28 cargo carriers. These ships are being offered at world market prices. In the case of the *Northern Pacific*, which is a vessel of 8255 gross tons and of 20 knots speed, the offers must be submitted before December 12. Bids on the other vessels will be opened on December 21. They include the following: Three 12,000 deadweight freighters, *South Bend*, *Marica* and *Edyllen*, built by the Sun Shipbuilding Company; *Eastern Merchant*, 12,000 tons, built in Japan by the Asano Shipbuilding Company; five Japanese vessels, *Eastern Trade*, 12,975 tons; *East Indian*, 11,679; *Eastern Shore*, 11,054; *Eastern Light*, 10,705; *Eastern Soldier*, 10,625; four Chinese-built freighters, *Mandarin*, *Cathay*, *Celestial* and *Oriental*, 12,000 tons, constructed by the Kiangnan Dock & Engine Works, Shanghai.

Two 5740-ton freighters, *Chickamauga* and *Pinellas*, built by the Merrill-Stevens Shipbuilding Corporation; four 5175-ton cargo carriers, *Bethnor*, *Macomet*, *Mason City* and *Maddequet*, built by the Bethlehem Shipbuilding Corporation; four 5075-ton fabricated steel ships, *Tashmoo*, *Toledo Bridge*, *Orinoko* and *Suwied*, built by Submarine Boat Corporation; two 5300-ton colliers, *Absecon* and *Tuckahoe*, built by New York Shipbuilding Corporation; *Minooka*, 5000-ton cargo, Mobile Shipbuilding Company; *Delfina*, 5210 tons, Hanlon Dry Dock & Shipbuilding Company; *M. J. Scanlon*,

8597 tons, New York Shipbuilding Corporation. In addition, three 150-foot sea-going tugs and four 1800-ton steel oil barges are being offered for sale.—*Nautical Gazette*, 3 December, 1921.

SHIPPING BOARD'S FIRST BALANCE SHEET.—The first full balance sheet ever prepared to cover the business of the Shipping Board was laid before Chairman Lasker last week. It is said to represent four months' work by accountants.

The total assets of the Board as of July 1 are shown as $307,400,000, exclusive of unexpected appropriations and the value of the fleet, and the total liabilities, exclusive of pending claims, as $115,878,000. The balance on hand, $191,500,000, offsets in part claims estimated at $200,000,000 to $300,000,000.

Detailed items of the report are as follows:

ASSETS

Cash on hand	$33,000,000
Accounts and notes receivable	33,954,000
Accounts receivable from managements	9,360,000
Operation supplies	10,850,000
Surplus materials for sale at inventory valuation	35,561,000
Land, structures and equipment for sale	42,229,000
Mortgages receivable and securities	10,865,000
Accounts and notes receivable from ship sales, not secured by mortgages	16,375,000
Notes receivable secured by mortgages	98,997,000
Real estate and equipment in operation	3,967,000

LIABILITIES

Accounts and vouchers payable, refunds of deposits and collections	$71,482,000
Mortgage bonds and mortgages payable, assumed upon acquisition of certain properties	2,109,000
Reserve against inventories of surplus materials and land, structures and equipment, including depreciation	42,287,000

According to President Joseph W. Powell, of the Emergency Fleet Corporation, the Shipping Board has lost about $25,000,000 since July 1, which has been more than offset by the appropriation of $48,000,000 granted by Congress.—*Nautical Gazette*, 26 November, 1921.

NEW SAN FRANCISCO-MEXICAN SERVICE.—The Compania Naviera de los Estados Unidos de Mexico (Mexican States Line) will begin, in the latter part of this month, a new passenger and freight steamship service between San Francisco and ports of Mexico and Central America. Fortnightly sailings are contemplated. The six vessels to be used in the new service are the *Sinola, Chihuahua, Chiapas, Oaxaca, Colima* and *Guerrero*. They will fly the Mexican flag and are under contract with the Mexican Government to carry mail. They have accommodations for seventy first-class passengers, sixty second-cabin and fifty steerage and have a cargo capacity of about 1500 tons. They are 270 feet long.—*Nautical Gazette*, 12 November, 1921.

BATTLE-CRUISERS AS PASSENGER STEAMERS.—Talk of scrapping our battle-cruisers after the disarmament conference has brought forth the usual number of weird proposals, one of which is that these vessels might be converted into vast passenger steamers of the *Aquitania* type. The amateur marine architects who made this brilliant suggestion apparently overlooked the fact that battleship and passenger ship hulls are totally unlike and that no amount of rebuilding could effect the desired transformation. A scheme just about as practicable was recently sprung by one of the editorial writers on an evening newspaper, who suggested that in view of the present

scarcity of housing accommodation the fleet of idle Shipping Board vessels might be moored along the east and west rivers and take in roomers.—*Nautical Gazette*, 3 December, 1921.

LLOYD'S 1920 WRECK FIGURES.—Lloyd's Register has just published its statistical summary of vessels totally lost at sea in 1920. According to its figures 585 vessels of 657,554 gross tons were lost from all causes. Of the total number of vessels lost 215 were sailing vessels with an aggregate tonnage of 138,950 and 370 vessels with a combined tonnage of 518,595 were steam.

The causes of loss are set forth in the following table:

How Lost	Number	Gross tons
Abandoned at sea	60	52,585
Foundered	80	53,878
Missing	43	46,665
Broken up, condemned, etc.	9	9,454
Burnt	52	95,077
Collision	36	38,399
Wrecked	255	322,066
Lost, etc.	26	24,479
Total	561	645,603

The following table shows the number of vessels of each flag listed which were included in the total of vessels lost:

Flag	Number	Tonnage	Percentage of tonnage
United Kingdom	99	131,481	0.76
British dominions	64	29,022	1.39
American	108	159,694	1.16
Danish	22	6,646	0.83
Dutch	15	4,417	0.25
French	40	63,866	1.97
German	19	10,280	1.53
Italian	10	13,287	0.59
Japanese	29	41,988	1.40
Norwegian	42	52,648	2.37
Russian	7	15,529	2.91
Spanish	18	14,826	1.49
Swedish	23	23,026	2.15
Other European countries	52	54,307	....
Central and South America	9	12,149	....
Other countries	3	5,377	....
No flag	1	7,060	....

The number and tonnage of vessels lost during the last ten years, excluding those lost through war causes, were as follows:

Year	Number	Gross tons
1911	888	884,843
1912	680	748,965
1913	665	717,030
1914	605	682,835
1915	582	793,975
1916	598	226,937
1917	619	777,105
1918	567	748,538
1919	666	636,830
1920	585	657,554

—*Nautical Gazette*, 19 November, 1921.

OCTOBER SHIPBUILDING OUTPUT IN DETAIL.—The Bureau of Navigation, Department of Commerce, reports 71 sailing, steam, gas and unrigged vessels of 50,265 gross tons built in the United States and officially numbered during the month of October, 1921, as follows:

	Atlantic and Gulf		Pacific		Great Lakes		Western Rivers		Total	
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
Wood										
Sailing	3	4,535	..	.....	..	..	..	.....	3	4,535
Steam	1	385	..	.....	..	..	1	55	2	440
Gas	26	1,988	9	228	3	62	5	163	43	2,441
Unrigged	6	1,304	..	.....	..	..	4	58	10	1,362
Total	36	8,212	9	228	3	62	10	276	58	8,778
Metal										
Sailing	..	.....	..	.....	..	..	..	.....	..	.....
Steam	3	13,065	3	22,008	..	..	1	1,537	7	36,610
Gas	2	571	1	3,803	..	..	1	59	4	4,433
Unrigged	2	444	..	.....	..	..	..	.....	2	444
Total	7	14,080	4	25,811	..	..	2	1,596	13	41,487
Summary										
Sailing	3	14,080	..	.....	..	..	..	.....	3	4,535
Steam	4	13,450	3	22,008	..	..	2	1,592	9	37,050
Gas	28	2,559	10	4,031	3	62	6	222	47	6,874
Unrigged	8	1,748	..	.....	..	..	4	58	12	1,806
Grand total	43	22,292	13	26,039	3	62	12	1,872	71	50,265

The above total includes 19 rigged vessels of 2191 gross tons and 3 unrigged vessels of 639 gross tons, total 22 vessels of 2830 gross tons built in years previous to 1921. There were not any vessels built for the United States Shipping Board or for foreign owners during the month of October, 1921. The largest vessels delivered during the month were the tankers *F. H. Hillman* and *Birkenhead* of 9835 and 6960 gross tons respectively.—*Nautical Gazette*, 19 November, 1921.

CONCRETE TANKER "FAITH" JUNKED.—In the Bureau of Navigation's bulletin of changes in American documented sea-going merchant vessels during October, the name of the concrete tanker *Faith* is subtracted on account of the vessel having been sold for junk. She is of 3427 gross tons and was built by the San Francisco Shipbuilding Co. only three years ago. The *Faith* was the first large concrete ocean-going vessel ever constructed.—*Nautical Gazette*, 26 November, 1921.

AERONAUTICS

HELIUM FOR AIRSHIPS.—In the course of an interview with a correspondent of a British newspaper shortly following the recent *ZR2* airship disaster, Maj. P. E. Van Nostrand, of the Balloon and Airship Division, Office of the Chief of Air Service, who was to have returned to America aboard the big dirigible, asserted that airships can be made safe, and that while helium is the best gas known for airships—and he hoped the time will

come when not only naval and military airships, but commercial airships as well, will be filled with helium—gasoline rather than hydrogen is the greater menace to the safety of airships. He is of the opinion that hydrogen can be used, and used safely, pointing to the fact that the hydrogen gas in the latter part of the *ZR2* apparently did not explode, but came down intact, demonstrating that buoyant gas, if it stays in the bag, is a help rather than a danger. He added that if the *ZR2* had been filled with helium, the result of the accident would have been little more than a casual wetting for the men aboard her—provided a less explosive fuel than gasoline had been in use.

Supply Still Limited.—At the present time, in view of the fact that the supply of helium is very limited and difficult to obtain, the problem is to find a less volatile liquid for burning than gasoline, and this, in Major Van Nostrand's opinion, is an easier proposition to obtain than helium.

Commercially pure helium has 92.6 per cent lift of pure hydrogen, and being absolutely inert has no deteriorating effect upon balloon fabrics, and is safe from combustion under all conditions.

Up to April, 1918, helium had been obtained only in extremely small quantities, and for scientific purposes only—the total amount probably not exceeding 100 cubic feet, at a cost of about $1700 to $2000 per cubic foot. The most promising fields thus far discovered are located in Texas, Kansas, and Ohio. It is believed by scientists that other sources of supply will be discovered, susceptible of development for the production of helium in balloon quantities, as the result of exploration work. At the present time such an exploration program is being actively prosecuted by the government.

After our entry into the war three experimental plants for the production of helium from natural gas obtained from the Petrolia pool at Petrolia, Texas, were erected. Two of these, known as Plants No. 1 and No. 2, were located at Fort Worth, Tex., the gas being supplied through a pipe line from the former place, and the last plant, known as Plant No. 3, was established at Petrolia.

Cost of Production.—The cost of producing one cubic foot of helium in a mixture of 92 per cent purity in Plant No. 1, the most successful plant to date, was about 39 cents, showing the extremely remarkable reduction in the price of producing helium, especially when the fact that this was an experimental plant and not of such proportions as to give lowest cost, is taken into consideration.

After helium of 92 per cent purity was produced in Experimental Plant No. 1, the navy, acting for the army and navy, entered into a contract with the Linde Co. for the erection of a large production plant at Fort Worth. Latest figures on the cost of producing helium in the new production plant, as estimated by the Navy Department, which is in charge of its operation, show that 94.5 per cent helium costs $150.01 per 1000 cu. ft., and 92.9 helium as $280.12 per 1000 cu. ft.

Helium provides the United States with a weapon of warfare which is apparently not available to any other nation, because nearly all of the practical supplies of helium so far discovered are contained within the borders of this country. On account of the anticipated further reduction in the cost of this product below the present figure, it would seem advisable that the government should not relax its endeavors to further the exploration and development of this gas, for with an adequate supply of helium the future of the military airship in this country would be assured.

The average production of helium in this country at the present time is such that, when compared with the production figures in the past, would indicate that helium production is making encouraging progress.

One of the most important problems that will have to be solved in connection with the use of helium in lighter-than-air craft is the question of its loss by expansion and consequent valving. Due to the excessive cost of this gas, a radical departure will have to be made in the method of hand-

ling the gas pressure than obtains at present with automatic valves in type *R* balloons and airships. The navy is preparing to conduct aerial experiments with helium in an airship of the *C* type, and the U. S. Army Air Service will do likewise upon the completion of an airship that is being designed particularly for the use of helium.

With regard to the repurification of helium, the Army Air Service has two plants under construction for conducting this work—one the Railroad Repurification Plant in Washington, and the other a stationary Repurification Plant at Langley Field, Hampton, Va., both of which are under the jurisdiction of the Bureau of Mines.

Helium Repurification Plant.—The Railroad Repurification Plant at Washington is now approaching completion, and consists of two cars, one utilized for producing power for the operation of the apparatus contained on the other car. This apparatus, through the process of refrigeration, absorbs the impurities (consisting principally of air—contained in the helium. The capacity of this plant is approximately 2000 cu. ft. per hour. Being built on standard railroad cars, the plant is capable of being transported to any section of the country upon short notice. It is intended to utilize it for repurification of helium in use at isolated stations where it is inadvisable to locate permanent repurification plants, the impure helium, at these stations being allowed to collect for a period of six months or so, stored in cylinders and then repurified upon the annual or semi-annual visit of the Railroad Repurification Plant.

The plant at Langley Field, Va., which was designed and developed for the Army Air Service by Dr. Harvey M. Davis, Mechanical Engineer, Harvard University, has a capacity in excess of 2000 cu. ft. per hour, and the method used is the liquification of impurities from the helium. Dr. Richard B. Moore, Chief Chemist of the Bureau of Mines, is in charge of this plant, assisted by Mr. Ferris of that Bureau, the latter being stationed at Langley Field. The plant is operated in conjunction with the hydrogen plant at this station.

It is anticipated that both the Railroad Repurification Plant and the plant at Langley Field will be ready for operation about the first of next year. The successful operation of these plants is assured, inasmuch as the laboratory designs which have been tested out have proved very successful.

Airship C-2 to Experiment with Helium.—Plans are in progress to make practical use of helium in navy airships in the near future. An immediate start is to be made in the experimenting with this gas at the naval air station, Hampton Roads, Va., where a non-rigid airship of the *C* class will be inflated.

This experimentation is being conducted in connection with tests in regard to buoyancy, valve control, permeability of airship fabric, and methods of handling helium in connection with all types of lighter-than-air craft. This will be the first airship in the world to be so inflated, and it is expected that important data will be obtained, which it is hoped will be of considerable value in future employment of the gas. This is in accordance with the provisions laid down by the Aeronautical Board of the army and navy for the experimentation and development of lighter-than-air craft.—*Aviation*, 28 November, 1921.

THE "ROMA" IN TEST FLIGHT.—The semi-rigid airship *Roma*, purchased from Italy by the United States, made her first test flights November 15, remaining in the air nearly four hours.

Officers at Langley Field, where the *Roma* was assembled, described the flight as most successful.—*Aerial Age Weekly*, 5 December, 1921.

AERIAL LIFEBOAT.—A lifeboat for the air is a new contrivance being perfected in London for safety of passengers flying over water. It is an

evolution of the parachute, by means of which the passengers can be released from a flying craft and dropped gracefully.

The device is so arranged that a pilot, when convinced that the chances of saving the lives of his passengers are extremely remote, simply pulls a lever, which releases the passenger compartment from the falling flying machine. The whole operation requires only four seconds. Tests have already proved satisfactory.—*Aerial Age Weekly*, 21, November, 1921.

MINE-LAYING AIRPLANES.—With the experimental work in the tactical use of aircraft such as the making of smoke clouds to hide formations and maneuvers, the dropping of toxic gas bombs from aircraft, and the construction of airplane carrier ships, it may be expected that the Naval Air Service will conduct tests of harbor and inlet protection with mines laid from airplanes. It would be an enormous task, and an expensive one in time and material, to cover any large area in this manner, but where there exists the combination of a limited period of time for the work and a small area to be covered airplane mine-laying might reasonably be expected to be successful. Little has been done along this line, though the Germans did successfully attempt the method on the Baltic Sea in 1917, we are reminded by Aviation, using seaplanes of the float type, known as torpedo planes. These were two-engined machines using either 200 horsepower Benz or 260 horsepower Mercedes engines. The use of twin floats permitted the attachment of the mine, or torpedo, between them and under the fuselage. A release system was arranged so that the mine could be freed by the pilot. These airplanes were normally loaded with eight 110 pound bombs or one torpedo. In laying mines, the airplane was flown within 10 to 15 feet of the water, and the mines, which weighed 800 pounds, with an explosive charge of 440 pounds, were released, automatically anchoring after sinking to a predetermined depth.—*Scientific American*, December, 1921.

NAVY TO TEST DORNIER BOAT.—The navy department is arranging for a special demonstration of the German *Dornier* all-metal flying boat, to be held at the naval aircraft factory in Philadelphia for the benefit of aeronautical manufacturers and engineers.

Secretary Denby said that it had been the policy of the Navy Department to purchase abroad examples of metal construction in order to study the latest development in the art. These tests at Philadelphia will include demonstration in flight of the *Dornier* flying boat, which is a post-war product of the Zeppelin Company, and was originally designed for commercial passenger service. Several other examples of foreign construction will be available for the detailed examination of the engineers invited to witness the demonstration.—*Aerial Age Weekly*, 21 November, 1921.

MOTORLESS AEROPLANE RECORD FLIGHT.—Interest in the motorless air machine has been stimulated by the arrival at Croydon Aerodrome of the *Aachen* glider, with which a flight extending over 20 minutes was made at a recent trial. The machine, which was launched from a hill 1000 feet high, is reported to have been maneuvered to an even higher level and to have made a landing at a point only 30 feet below the original height of 1000 feet. The previous time record for flights in machines of this type was beaten by six minutes. It is understood that other types of German gliders are likely to be sent to England, and that a series of gliding tests will be carried out. Aviation optimists suggest that it might be possible to produce for sporting purposes an aeroplane designed on the lines of motorless gliders, but which, fitted with an engine of about two and one-half horsepower, would be able to make comparatively long low-speed flights.—*The Engineer*, 18 November, 1921.

"ROMA" IS READY.—The *Roma*, America's largest airship, is now ready to make her maiden flight in this country. For several months the big ship has been under construction in the big airship hangar at Langley field. Now she awaits the word which will open the giant doors of her berth and release her anchorage preparatory to the test flight which will later be followed by an exhibition and trial flight or cruise.

A special docking rail is being constructed leading from the landing field to the hangar. The first flight will probably be made before this feature is completed, although it will be necessary to call upon the entire personnel of the field to handle the ship with security when this mechanical arrangement is not utilized.

The thousands who have watched with interest the construction of the airship and hope to see her in flight will appreciate the statement for which Major Thornell, who is in command of the *Roma*, is authority, that at least 24 hours' notice will be given the residents of Langley field and vicinity of the time of the first flight of the big ship.

The crew of the *Roma* will consist of from 12 to 15 enlisted men, while four or five officers in addition to the commander of the ship will be on board on all flights.

One feature of the ship is the photographic department, provision being made not only for the usual taking of aerial pictures but also for the development and printing of negatives while in flight. A complete photographic dark room is being fitted up in a roomy compartment directly under the passenger cabin.

Another interesting and practicable feature is the powerful radio equipment which is being installed which will enable persons on board to converse with ease with other aircraft or land stations many miles removed from the mighty ship of the air.—*Aerial Age Weekly*, 21, November, 1921.

NEW AIRSHIP "NAPOLI" IS TO ECLIPSE "ROMA."—The giant airship *Roma*, which Italy sold to the United States Government, is looked upon as such a great success that the Italian air authorities are building another on much the same lines, only bigger and better, profiting by experience. It will be called the *Napoli* or *Naples*, and probably will be the second of a large fleet of air monsters.

The *Roma* measures 34,000 square meters; the *Napoli* will be 54,000. Like the *Roma*, the *Napoli* will be of the semirigid type. Her shape will be much the same as the sister airship though more elongated.

As in the case of the *Roma*, the car will be in the steel beams of the ship. It will hold a commandant's cabin with all necessary instruments, a passengers' cabin, a dining room, lounges and a kitchen run with electricity.

At the rear of the ship will be terraces for the passengers to admire the scenery at their ease.

There will be 12 Spa motors of 300 horsepower each, Italian designed and constructed. They are to be set tandem, and may be repaired and even changed, if needful, during flight.

The *Napoli* will be able to carry a hundred passengers. With only four of its engines working its speed is expected to be 43 miles an hour.—*Aerial Age Weekly*, 5 December, 1921.

"HELICOPTER" FLIGHT.—In an interesting article in the London Observer Major C. C. Turner comments on *Helicopter* flight as follows:

Experiments with *Helicopters*—machines with horizontal screws giving vertical ascension—are being carried on in many countries, and in Great Britain, the United States, and France are helped by the government. The results of late have been far more encouraging to the inventors than were those obtained before the war, and there is no doubt that the great progress in aerodynamics due to aeroplane research, especially under the stimulus of the war, is helping the helicopterist.

References to *Helicopter* experiments are often sensational. It is made to appear that vertical flight is what the whole aeronautical world is breathlessly awaiting; that it will revolutionize flying, since it would enable machines to land on flat roofs and to hover over an enemy. Yet upon consideration one seriously doubts whether even complete success with the *Helicopter* would make much difference; although one would not go so far as to say that experiments are without scientific value.

Criticism of the *Helicopter* usually takes the form of pointing out that, if the engine fail, descent will be as vertical as the ascent and a hundred times as fast. The criticism is met by the assurance that the *Helicopter* whose engine fails may descend slowly, which was proved in England and elsewhere with large-scale models some years ago. Admittedly there are mechanical difficulties in ensuring the rotation in the right direction, under the pressure of the air, of the propellers in the event of engine stoppage; but the difficulties appear to have been overcome by certain experimenters.

Another difficulty is that of securing horizontal speed and direction. This has been solved, theoretically, by a slight inclination of the axis, so that the screws rotate in an inclined plane when, it is claimed, very great speed is attainable. The preservation of balance is another problem which, however, has in theory been solved in more than one way, always, however, by mechanism admittedly complicated. Practical proof has not yet been given; and one cannot but fear that this and other elements of the *Helicopter* proposition will demand a toll of damaged machines and, perhaps, of life.

M. Damblanc, discussing the experiments at a meeting of the Royal Aeronautical Society, had to admit that a descent with engine stopped would be at the rate of about 10 miles per hour; and this, of course, in vertical contact with the ground to a machine weighing half a ton or more, would mean serious risk of wrecking; it would certainly call for a very remarkable shock-absorbing contrivance, which would be very heavy. And, if under the influence of wind, the descent were aslant the difficulties would be increased.

None of the helicopterists can yet claim that balance could be so nicely preserved in the last 100 feet of descent, where the air is so often "uneven," as to make the landing perfect. Still more disturbing is the thought that the engine might fail at so low an altitude that the fall-checking action of the propeller could not take effect.

The aeroplane, on the other hand, lands on a gentle gradient, so that even high speed is, within limits, no danger; and wind makes it easier by reducing the ground speed.

On the whole proposition, including that of the conversion of power expended into useful work done, it would seem that the aeroplane must have the best of the argument. Perhaps the difference between the two may be likened to the difference between using wheels in mechanical traction and attempting imitation legs!

As regards performance, there remain some serious drawbacks to the *Helicopter*. M. Damblanc, one of the foremost workers, has to admit that the utmost height attainable by his design would be about 5000 feet, and that as that height was approached ascent would be extremely slow, and would call for the sacrifice of all impediments. If this, indeed, be the limit, the prospects before the *Helicopter*, whether for war or for commerce, are gloomy. Of course, we must assume that, as in the aeroplane, the limit of to-day will be surpassed to-morrow. But any important development in power, yielding more thrust in proportion to weight, would benefit the aeroplane quite as much as it would the *Helicopter*.

Of reported *Helicopter* experiments may be mentioned those of *Berliner* and of *Hewitt* and *Crocker* in America; the combined aeroplane *Helicopter* of Pescara, the Spanish inventor, which ascended to 3½ feet the other day;

Mr. Louis Brennan's machine in England; and the work of Mr. Ellehammer, the Danish aviator who flew an aeroplane as long ago as 1906. The first helicopterist to be injured was M. de Payer, who broke an arm last year, and is said to have ascended to 400 feet the other day, his machine then being wrecked. Then there is the *Petroczy Helicopter,* which in its first experiments has been held captive on a cable; and it is suggested that it might supersede the kite-balloon, being equally good for observation purposes without offering so big a target or requiring to much space or field equipment.

The aeroplane, meanwhile, is steadily being improved, especially by means of the new high-lift wings. And high-lift wings that could be varied during flight, especially in conjunction with propellers of variable pitch, would greatly increase the range of speed, enabling very fast machines to land slowly and in small spaces.—*Aerial Age Weekly,* 28 November, 1921.

AID ECUADOR'S AVIATION.—France and Italy have entered into an agreement with Ecuador with the object of organizing and developing that country's military, maritime, postal and commercial aviation, the Department of Commerce was advised November 17 in a consular report from Guyaquil.

The agreement provides for the establishment of aviation missions in Ecuador to aid in the development of aviation.—*Aerial Age Weekly,* 28 November, 1921.

IMPROVED PARIS AIR SERVICES.—The sale of British machines to a French aviation company for use on London-Paris services is a distinct achievement on the part of the British aircraft industry. The Grand Express Aériens, who are the purchasers, have this week taken delivery of a new type Vickers-Vimy aeroplane. This machine, which is fitted with two 450 horsepower Napier "Lion" engines, will carry 14 passengers, and at the designed speed of 130 miles per hour the trip between London and Paris should be performed in one hour and 45 minutes. If rumor can be credited, this British machine is the first of several which are being acquired by the same company.—*The Engineer,* 11 November, 1921.

FLYING IN FOG.—Experience has made it quite clear that until a satisfactory device for enabling the pilot of an air machine to fix his position in foggy weather has been produced regular aeroplane services are impossible. Wireless direction finding has done something to simplify the problem, and much interest has been aroused by the claims made for the Reid indicator. The apparatus consists of an upper row of lamps controlled by a mercury device, a lower row controlled by a gyroscope, and an air speed indicator. It is asserted that by means of the signals given by the lamps and indicator it is possible for the pilot to obtain all the information which will enable him to fix his position during fog with practical accuracy, so that point-to-point flying can be undertaken with the certainty of reaching destination. The air speed of the machine, rate of turn, direction of sideslip, and movement necessary to preserve correct course are all recorded for the information of the pilot. As the result of experiments extending over a period of 18 months, those associated with the new device, which is being manufactured by Vickers, Limited, recommend its use with great confidence.—*The Engineer,* 11 November, 1921.

EXAMINATION OF NAVY RESERVE OFFICERS.—The following memorandum concerning examinations of reserve and temporary officers for commission in the line of the U. S. Navy, which was prepared by the Bureau of Aeronautics, Navy Department, is of interest:

1. The following tabulation shows in chronological order the sequence of events connected with the examination and recommendations for commis-

sion of certain reserve and temporary officers for commission in the line of the navy under Act of June 4, 1920:

August, 1919—Director of Naval Aviation sent letter to commanding officers of all air stations, commanders air forces, stating that examinations would be held and directed commanding officers to start classes of instruction.

June 4, 1920—Congress passed Act H. R. 13108, authorizing transfer of temporary and reserve officers to permanent rank or grade for which they might be found qualified.

August, 1920—Bureau of Navigation issued a circular letter to the service stating examinations authorized above would be held starting May 16, 1921.

May 16, 1921—Examinations started.

Oct. 6, 1921—Bureau of Navigation published a list of temporary and reserve officers found qualified for permanent commission, as follows:

Recommendation of Examining Board.—The following was the recommendation of the Examining Board:

Number who took the examination	1651
Number who failed to finish	21
Number considered for commissions	1630
Number recommended for commissions	931
Number recommended for Ch. Warrant and Warrant Grade	370
Number not recommended	329
Total	1630
Percentage recommended for commissions	57.1 per cent
Percentage recommended for Ch. W. and W. grade	22.7 per cent
Percentage not recommended	20.2 per cent
Total	100.0 per cent
Number of temporaries who took the examination	1192
Number of reserves (Classes 1, 2, 3, 4) took examination	194
Number of reserves (Class 5-Flying Corps) took examination	244
Total	1630
Number of temporaries recommended for commission	694 — 58.2 per cent
Number of reserves (Classes 1, 2, 3, 4) commission	85 — 43.8 per cent
Number of reserves (Class 5) rec. for commission	152 — 62.3 per cent

SPENCER S. WOOD,
Rear Admiral, U. S. N., President;
BENJAMIN C. BRYAN,
Rear Admiral, U. S. N., Member;
ROBERT W. MCNEELY,
Captain, U. S. N., Member.

2. From the above it is to be noted that the number of officers of Class 5, reserve (aviation officers) who were recommended for commission by the Secretary of the Navy is higher than any other group of officers taking these examinations.

3. Examinations as held were competitive in nature, similar to examinations held for entrance to the Naval Academy. The examinations were held at the same hour and date all over the world, and examination papers were forwarded to Washington, where they were marked by the Naval Examination Board. Candidates who were unable to be present at the examinations at the hour and date named, due to sickness or other cause, were not permitted to take another examination, this in view of the fact that the examination was of a competitive nature.

4. The Act of June 4, 1920 (H. R. Bill 13108) authorized the admission to the line of the Regular Navy, *in the permanent grades or ranks for which they might be found qualified, of 1200 officers, 500 of whom could be aviation officers (Class 5).*

5. Examinations were given in all professional subjects of which a knowledge is required of line officers of the navy. The law requires, very properly, that all officers, including aviation officers, should qualify in regular line subjects. It must be realized that a naval aviator, in addition to being able to fly, must have a thorough knowledge of navigation, a sufficient knowledge of seamanship, a thorough knowledge of gunnery and weapons used in airplanes, bombs, naval ordnance, spotting and a certain amount of international law in case he should land in a foreign country on a foreign shore. He should understand a certain amount of electricity in order to communicate, as well as for the safety and operation of his plans or balloon. These subjects are necessary, owing to the fact that the majority of naval aviators are later returned to regular duty as line officers. Class 5 officers were given the special privilege of omitting one of the following subjects: navigation, steam engineering, ordnance and gunnery, electricity—and were permitted to take in its place a special examination on aviation subjects. It is a notable fact that quite a number of the class 5 officers did not elect to take their own subject—aviation—and also that a number of them failed to pass in this subject. It will be noted that eleven and a half months elapsed from the time notice was given that the examinations were to be held and the time of holding the examinations, so that they had ample time to prepare themselves. It is true that the bombing experiments took up much time just before the examinations, but had these officers taken advantage of opportunities to study, it is believed that nearly all of them could have passed. At the stations where they were compelled to study, nearly all passed. For instance, at Howden, England, all the reservists and temporaries passed. At San Diego 63 per cent passed, and at Pensacola 57 per cent passed.

6. The aviation questions were prepared by qualified aviators, and the papers were marked by aviators. Great weight was given by the Examining Board to reports on fitness, and the action of the Examining Board was most liberal.

7. Subjects covered by the examination were: Navigation, engineering, ordnance and gunnery, seamanship, international law, military law, electricity, aeronautics, navy regulations.

8. The following was the result of the aeronautic examinations:

Of temporaries .....58.2 per cent passed
Of reserves—
Classes 1, 2, 3, and 4.....43.8 per cent passed
Class 5 (aviators) .....62.3 per cent passed
Of 244 Class 5 aviators—
39 took line examinations, voluntarily omitting aeronautic examinations.
205 took aeronautics.
Of 205 aviators who took aeronautics—
81 aviators failed in aeronautics, their own specialty.
Of 31 temporaries who took aeronautics—
17 temporaries failed in aeronautics.

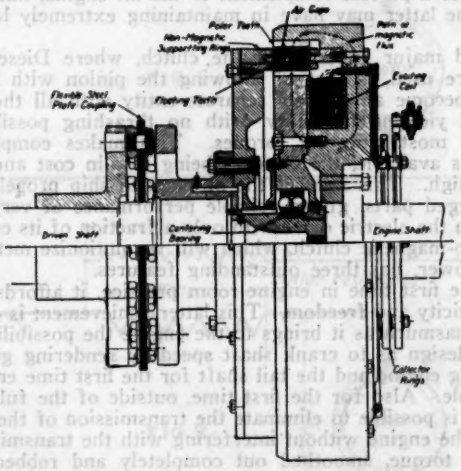
NOTE.—The questions in aeronautics were made up by officers now in Bureau of Aeronautics and were marked by three qualified aviators.

The officers who, through no fault of their own, were prevented from taking the examinations, will be given an opportunity to take an examination.—*Aviation*, 14 November, 1921.

ENGINEERING

NEW ELECTRO-MAGNETIC CLUTCH HAS BEEN DEVELOPED FOR DIESEL ENGINE DRIVE.—A new electro-magnetic clutch has been developed which, operating on a hitherto unused principle, and when used in conjunction with the Diesel type of engine, affords a speed flexibility equalling that of the reciprocating steam engine. This clutch fulfills the requirements of a positive yet completely elastic drive and is a unique correlation of two oppositely applied forces, each producing powerful torques induced and brought under perfect control by the application of a most insignificant amount of external electric energy.

The drive has no sliding parts, is extremely small for power transmitted and is applicable to any range of horsepower. This new type of clutch transmits power entirely through air gaps, and there being no mechanical contact between the driver and driven, wear and deterioration are eliminated. It is capable of remote control and can be operated at any fractional speed from zero to full engine speed. The power required to operate the clutch at full load is but a small fraction of one per cent of the power transmitted. In one instance 525 horsepower required 256 watts, equal to .065 per cent. One of the outstanding features of the clutch is that on direct drive or full speed it is magnetically locked, which ensures perfect synchronism and no slip with a high pull-out torque.



SPERRY MAGNETIC CLUTCH COUPLING AS USED WITH 700 H. P. DIESEL ENGINE.

The diagram on this page shows the detailed construction of one form of a complete embodiment of the clutch. The exciting coil in the driving element induces an intensive magnetic flux which passes through the teeth embedded in non-magnetic current conducting rings. The driven ring constitutes a closed secondary circuit similar to the rotor of a squirrel cage induction motor, which gives high torque at all fractional speeds. The flexible short steel coupling to the extreme left, which may or may not be employed as desired, secures complete freedom of alignment.

In the problem of transmission of power on board ships gears offer a simple solution, but gears have never been successful with reciprocating engines, particularly where the pinions are integral with, or are solidly

locked to, the heavy revolving masses of the engine crank shaft with its characteristic crank effort impulses. No amount of pains to smooth out the peaks by flywheels or other devices have proven successful. Engineers therefore, have resorted to electrical drives, which though they attain in a measure the object of most efficient speed for both engine and propeller, have several drawbacks. They are very heavy, the controls are decidedly extensive and intricate, the first cost is high and they suffer great efficiency losses. In the case of the oil engine the problem is simplified over the turbine in two ways—first, the speeds are lower and, second and more important, the oil engine is capable of full and quick reversal.

It is just here that the new powerful electro-magnetic clutch steps in with its air gap drive, and offers a complete solution.

It permits complete latitude as to propeller shaft speed regardless of the engine speed, the clutch being designed and organized to allow a degree of slip or fractional driving for definite periods.

It constitutes a perfect complement to the oil engine, filling in any deficiency that the latter may have in maintaining extremely low crank shaft speeds.

The second major function of the clutch, where Diesel engines with gear drive are used, is that of allowing the pinion with its slight mass moments to become an entirely separate entity with all the advantage of complete and yielding flexibility, with no thrashing possible even when receiving the most powerful torques. This makes comparatively inexspensive gears available, the clutches being low in cost and the efficiency exceedingly high. This reduces the oil-engined ship propelling equipment to a few rugged parts, giving reliable performance at very much higher efficiency than the electric drive with only a fraction of its cost and weight.

This electro-magnetic clutch, which will revolutionize methods of transmission of power, has three outstanding features.

(1) For the first time in engine-room practice, it affords complete torque-wise elasticity and freedom. This latter achievement is of far reaching significance inasmuch as it brings to the engine the possibility of complete freedom of design as to crank shaft speed by rendering gearing between a reciprocating engine and the tail shaft for the first time entirely practical and dependable. Also for the first time, outside of the full electric drive equipment, it is possible to eliminate the transmission of the large rotating moments of the engine without interfering with the transmission of useful torque. The torque, smoothed out completely and robbed of its heavy pulsations and irregularities, is thus passed on to the gear and tail shaft entirely free from concussion.

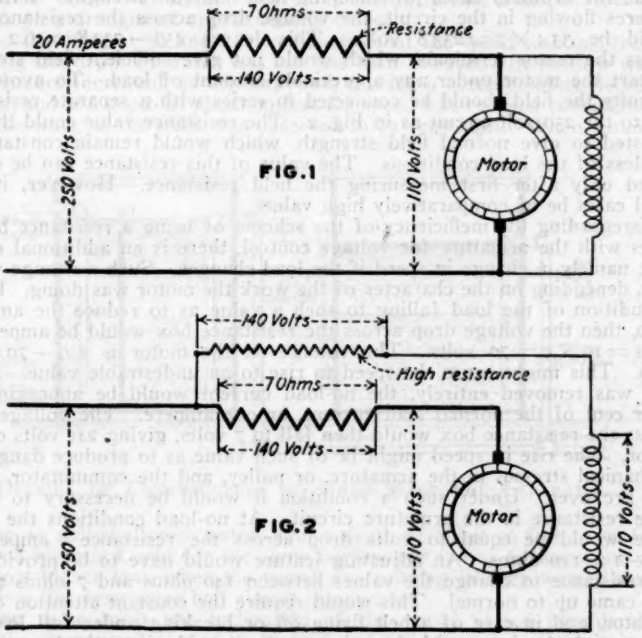
(2) Another outstanding feature of the clutch, never heretofore achieved, is the "squirrel cage secondary" operating through pure induction, which allows continuous slipping at any fractional rate, without excessive temperature rise. Thus the clutch supplements the engine completely at all fractional speeds below the stable operating speed of the engine.

(3) The clutch operates as an automatic emergency disconnecting device, permitting the instant breaking away from the large mass moments of the engine and allowing the propeller to "stop in its tracks," whenever it encounters an obstacle whose resisting force exceeds the available maximum pull-out torque of the clutch.

This clutch has been developed and is manufactured by the Sperry Gyroscope Company of Brooklyn, New York.—*Nautical Gazette*, 26 November, 1921.

EMPIRE AND POWER ALCOHOL.—The Imperial Motor Transport Council of delegates from Empire governments has just held a conference under the auspices of the Empire Motor Fuels Committee. The discussion which took place turned mainly on the present position relating to customs and exercise restrictions and as to suitable methods of denaturation. The

Council, which includes representatives of British India, Australian Commonwealth, Union of South Africa, British Columbia, Quebec, and the Crown Colonies, decided to request the various governments concerned to take the necessary action in connection with the subjects mentioned in order to facilitate the production and distribution of industrial and power alcohol throughout the Empire. A recommendation was also made that each Empire government should consider the advisability of putting forward at a future conference proposals regarding the adoption of common methods of and formulæ for the denaturation of alcohol. It is hoped that the work of the Council will bear fruit. The need of doing everything



FIGS. 1 AND 2.—Diagram showing resistance connected in series with a motor.

possible to promote the use of Empire alcohol is quite obvious. The age of liquid fuel is being ushered in.—*The Engineer*, 11 November, 1921.

OPERATING A DIRECT-CURRENT MOTOR ON INCREASED VOLTAGE.—To take care of an emergency, it is sometimes necessary to operate a motor on a higher voltage circuit than the machine is rated for. Under such circumstances in order to reduce the voltage to the proper amount for the motor, a resistance box is placed in series with the machine. Suppose, for example, a motor rated 110 volts and 20 amperes, is to be operated on a 250-volt circuit. With the normal load on the motor and the voltage adjusted to 110 volts at the motor terminals, the voltage drop across the resistance box would have to be $250 - 110 = 140$ volts. The resistance necessary for this condition would be volts $\div$ amperes $= 140 \div 20 = 7$ ohms. With normal load the line voltage would be divided into 140 volts across the resistance

box and 110 volts across the motor terminals, as indicated in Fig. 1. Inasmuch as the voltage drop across the resistance box varies directly with the current, it will be seen that any variation of current will change the applied voltage to the motor. This has the main objection of changing the field strength of the motor as well as causing a change in speed due to the change of voltage on the motor. For example, take the extreme condition that would be obtained at starting. Let it be assumed that the resistance of the armature for this particular motor is 0.5 ohm. The total resistance in the circuit is $7 + 0.5 = 7.5$ ohms, and the starting current that would flow when the circuit was closed is total volts $\div$ total ohms $= 250 \div 7.5 = 33.4$ amperes. This value of current would give sufficient startling torque for ordinary cases provided the field had full strength. With 33.4 amperes flowing in the circuit, the voltage drop across the resistance box would be $33.4 \times 7 = 233.8$ volts. This leaves $250 - 233.8 = 16.2$ volts across the motor terminals, which would not give sufficient field strength to start the motor under any appreciable amount of load. To avoid this difficulty the field should be connected in series with a separate resistance box to the 250-volt circuit as in Fig. 2. The resistance value could then be adjusted to give normal field strength, which would remain constant regardless of the load conditions. The value of this resistance can be determined only after first measuring the field resistance. However, it will in all cases be of comparatively high value.

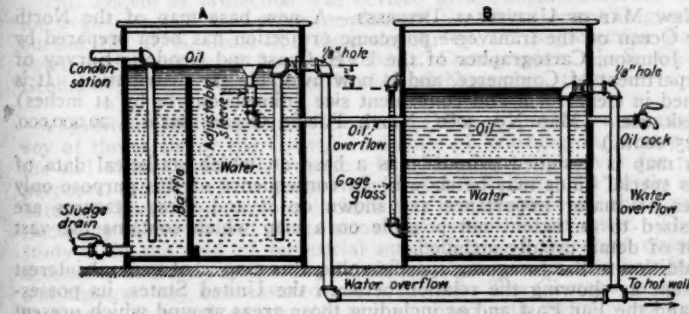
Disregarding the inefficiency of the scheme of using a resistance box in series with the armature for voltage control, there is an additional objection; namely, a change in speed if the load changes. Such a change would vary, depending on the character of the work the motor was doing. Under a condition of the load falling to such a value as to reduce the amperes to 10, then the voltage drop across the resistance box would be amperes $\times$ ohms $= 10 \times 7 = 70$ volts. The voltage on the motor is $250 - 70 = 180$ volts. This might cause the speed to rise to an undesirable value. If the load was removed entirely, the no-load current would be approximately 5 per cent of the normal load current, or one ampere. The voltage drop across the resistance box would then fall to 7 volts, giving 241 volts on the motor. The rise in speed might be of such value as to produce dangerous mechanical stresses in the armature, or pulley, and the commutator might also arc over. Under such a condition it would be necessary to insert more resistance in the armature circuit. At no-load conditions the resistance would be equal to volts drop across the resistance $\div$ amperes $= 140 \div 1 = 140$ ohms. An adjusting feature would have to be provided in the resistance to change the values between 140 ohms and 7 ohms as the load came up to normal. This would require the constant attention of the operator, and in case of a belt flying off or breaking under full load the motor might be damaged before the operator could adjust the box. If the motor was connected by gears or direct-connected to a shaft driving a pump or similar load, then as the speed increased the load would increase also, which would tend to keep the speed from reaching an excessive value. The actual increase of speed in such a case would depend on the character of the work and would lessen to a certain extent the need of the operator's attention. Under such conditions it should be kept in mind that this arrangement is generally anything but satisfactory.—*Power*, 29 November, 1921.

"TAMPA'S" REMARKABLE STOPPING ACCOMPLISHMENT.—The United States Coast Guard cutter *Tampa*, first vessel of its kind to be electrically equipped throughout, has arrived at New York after a fast voyage from San Francisco via the Panama Canal. Captain W. J. Wheeler reported a remarkable accomplishment made by the *Tampa*. He said the ship had been brought from full speed ahead of 15 knots, to a dead stop in less than the length of the vessel. This is more than three times better than the record made by any previous cutter and was attributed to the ease of control made possible by the electric drive.

Steam-driven cutters have usually been brought to a standstill in not less than three boat lengths. This feature of quick stopping adds considerably to the maneuvering qualities of the ship and is a factor of much importance to revenue vessels.—*Nautical Gazette*, 19 November, 1921.

EFFECT OF SHALLOW WATER ON SPEED OF SHIPS.—During recent years, considerable attention has been paid to the effect of shallow water on the speed of ships, observes Mr. Harold E. Yarrow. In a fast vessel the wave-making resistance varies materially with the depth of the water through which she is moving. Formerly it was generally accepted that in shallow water the speed was reduced, but trials with a destroyer over a course where the depth of water varied demonstrated that this was not altogether true. This vessel was about 220 feet in length, having a displacement of 400 tons on a draught of approximately 6 feet.

When traveling at 30 knots it was found that the speed was unaffected, providing the depth of water was not less than 180 feet. In shallow water the resistance increased, as was expected, causing a corresponding decrease in speed, and at a depth of about 90 feet the speed was reduced considerably, while the wave at the stern was observed to be very high. When running,



DETAILS OF CONSTRUCTION OF HOME-MADE OIL SEPARATOR.

however, in still shallower water, with a depth of about 30 feet to 50 feet, the speed increased, and for the same horsepower it was between one and two knots higher than when the vessel was running in deep water; at the same time the stern wave had almost disappeared.

During these trials the inclination of the vessel varied considerably. When the stern wave was at its highest and the resistance at a maximum she settled down at the stern, and in shallow water, with very little stern wave, she approached an even keel. By means of various spirit levels suitably arranged to indicate the trim of the boat, it was found possible to ascertain approximately the depth of water in which the vessel was running.—*Nautical Gazette*, 19 November, 1921.

HOME-MADE OIL SEPARATOR.—In many plants there are a number of low-pressure traps discharging hot water heavily laden with oil. Usually, both the water and oil are wasted unless the installation is of sufficient size to justify the installation of a filter and purifier, in which case the heat in the water is recovered and the oil may be used again for certain purposes.

At small expense an oil separator can be made from two tanks or barrels and some pipe fittings, which will speedily pay for its cost in the saving of cylinder oil alone, besides adding materially to the hot-water supply.

Such an installation is shown. The operation is as follows: The oil-bearing hot water comes from the traps into the tank *A*, where some

separation takes place and the oil rises in the current of water and passes over the baffle. The funnel opening is just even with the water level in this tank, so that the agitation caused by the incoming water splashes the top layer of oil and water into the funnel and hence into the pipe leading to the storage tank *B*. The remainder of the water in tank *A* passes out through the siphon pipe from the bottom and carries no oil to the hotwell. A hole is drilled at the upper end of this pipe to prevent siphoning out too much of the water at once.

The oil overflow carries some water over into the tank *B*, where the oil remains in a strata at the top and the water passes out through a siphon pipe similar to that in tank *A*, but smaller. Both siphon pipes should be large enough so that at no time is it necessary for them to be more than half full.

The oil level should be watched in the glass and some drawn off before the gage fills; otherwise the action of the system is automatic. This salvaged oil is usually of good quality and may be used again for many lubricating purposes or even for steam-cylinder work if filtered.—*Power*, 15 November, 1921.

NAVIGATION AND RADIO

A NEW MAP OF UNIVERSAL INTEREST.—A new base map of the North Pacific Ocean on the transverse polyconic projection has been prepared by W. E. Johnson, Cartographer of the U. S. Coast and Geodetic Survey of the Department of Commerce, and is now available for distribution. It is published in clear form and convenient size (dimensions 14 by 41 inches) for desk use. (Map No. 3080, North Pacific Ocean, scale 1:20,000,000, price 25 cents.)

This map is designed primarily as a base on which statistical data of various special kinds may be shown. In consequence of this purpose only features of major importance are shown on it and these features are emphasized to an extent not possible on a map which contains the vast amount of detail usually included.

In addition to the foregoing specific value, this map is of general interest at present as showing the relation between the United States, its possessions, and the Far East and as including those areas around which present problems in the North Pacific Ocean are centered.

This map represents the acme of scientific precision combined with simple practical utility. It extends from New York and Panama to Singapore and Calcutta, from Alaska and Siberia to the Hawaiian Islands and includes a part of South America and a portion of Australia. Through its lateral center it extends over 180°, or more than half way around the earth.

The distinctive feature of the map is that these localities are here pictured in practically their true relation as to distances, areas, and comparative angular direction of coast line. It will thus serve to correct the erroneous impression that we have all received from the usual representation of this region on Mercator charts and maps which greatly exaggerate areas and distances toward the poles when compared with their equatorial equivalents, and to the eye present the general continental coast lines out of their proper angular relation to one another. This is not a criticism of the Mercator projection for use in navigation, but merely of its use for purposes for which it is not adapted. In fact, if the Mercator projection were transversed just as the polyconic has been, the result would be only slightly different.

The problem of representing any considerable portion of the ellipsoidal form of the earth on a plane surface is not readily dealt with, or, in other words, is intractable. Always some desirable features must be sacrificed in order to incorporate those of primary value to the problem or area at hand. In the present instance, the property of true scale along a great circle tangent to the forty-fifty parallel of north latitude at the central

meridian of the map was chosen. This great circle is approximately the shortest distance between San Francisco and Manila, and in close proximity to it lie practically all the important points of interest, such as the Panama Canal, Mexico, our Pacific Coast, Alaska, the Philippine Islands, Japan, and the coast of China. This is accomplished through the use of the transverse polyconic projection, which is the regular polyconic or American projection turned from its normal vertical axis to a lateral great circle axis. This is an involved and laborious operation, but the resulting advantages are well worth while where areas of this nature are presented and accuracy is desired.

Both the vertical and lateral axes are straight lines, true to scale, and represent the shortest distance (great circle) between their extreme points. From these central lines the scale gradually expands toward the corners of the sheet where the maximum error occurs, thus quite a wide band of small scale error is preserved through the lateral center wherein lie the majority of the important cities, commercial areas and trade routes of this region.

This system of projection was devised by Ferdinand Hassler, who was the organizer and first superintendent of the oldest scientific government bureau, the U. S. Coast and Geodetic Survey. This projection was computed and constructed by C. H. Deetz, Cartographer, U. S. Coast and Geodetic Survey.—*Aerial Age Weekly*, 28 November, 1921.

VARIATION OBSERVATIONS.—The yacht *Carnegie*, making a magnetic survey of the earth for the Carnegie Institute of Washington, is now nearing the end of its 65,000-mile voyage. In addition to the survey for practical purposes, the staff of the yacht is making observations of a purely scientific nature. These observations include the measurement of the amount of electricity in the air and of the amount of radium in sea water. The whole study is in the field of terrestrial magnetism and the chief object is to determine as closely as possible the nature of magnetism, and how its effects and changes may be measured and predicted. The *Carnegie* is an entirely non-magnetic vessel, constructed and equipped with virtually no iron, steel or other magnetic substances. She is a sailing vessel having a small auxiliary engine capable of making four knots. The engine and galley stove are of brass and the anchors of bronze. In the building of the hull only locust spikes were used.—*Tech. Engineering News*, December, 1921.

HIGH INTENSITY BEACON ON STATEN ISLAND.—The Sperry Gyroscope Co. has erected a high intensity vertical beacon at Tompkinsville, Staten Island, about 100 feet in from the shore and 1000 feet eastwardly from the great Municipal Ferry Docks connecting with South Ferry, Manhattan. The light will be vertical over this spot, gradually waving between 10 and 15° each side of the vertical, making four beats a minute. The Lighthouse Commission is issuing a circular requesting observation on this beacon. Pilots of the U. S. Air Service are requested to make observation at the first opportunity and report to the Chief of Air Service as to the observation possible under the various weather conditions existing over Staten Island.—*Aviation*, 28 November, 1921.

WIRELESS TELEGRAPH DEVELOPMENTS.—It was a somewhat remarkable feat which was carried out from the new American wireless centre at New York a few days ago. The message sent out by the President of the United States expressing his hopes of continued peace throughout the world was received wherever suitable apparatus had been installed. The new radio centre on Long Island is the most important of the kind that has yet been constructed, and when the whole of the equipment is in place it should be possible to conduct simultaneous communication with five different parts of the world. Transmitting apparatus is to be provided for both Transatlantic and Transpacific ranges, and the equipment has

been designed to make provision for the inevitable development of Transatlantic wireless telephony. Important developments are also projected in Australia, where it is understood the government is likely to enter into an arrangement with the Amalgamated Wireless Company for the erection of a high-power station capable of direct communication with both the United Kingdom and America. The experimental stations of the company have been able to give direct communication with New York and European stations for some time past, but the new station would enable a regular commercial service to be provided. It is reported from Australia that the company named would probably operate the new station under government supervision, although the company would be quite prepared to finance and operate the station itself, or to sell its rights to the government.—*The Engineer,* 11 November, 1921.

SIGNAL TO JAPAN.—The American Navy's powerful radio station at Annapolis has been in direct communication with Japan, exchanging wireless signals with the powerful new Japanese station at Iwaki, 8000 miles distant. Annapolis had made many previous attempts to reach Iwaki and failed; and the connection this time was obtained accidentally. A naval operator, while calling San Diego, received a faint signal on San Diego's wave, but found it to be from the Japanese station. Naval experts were astounded that the connection had been made, and now attribute it to atmospheric conditions, since subsequent attempts to reach Iwaki have failed.—*Tech. Engineering News,* December, 1921.

ORDNANCE

THE BIGGEST BOMB IN THE WORLD.—At the recent meeting of the Army Ordnance Association at Aberdeen Proving Ground an opportunity was afforded those present to see the latest development in aircraft bombs—the 4000-pound Demolition Bomb, probably the largest bomb in the world. It is doubtful, however, if many members of the association, not to mention the general public, whose impression has been gained in motion pictures, fully appreciate the great size or destructive power of this super bomb. It measures 13½ feet in height (from fins to nose). It is nearly 2 feet in diameter, and has an actual weight of about 4300 pounds, of which approximately 2000 pounds is high explosive. So far as is known, no other country has produced a similar weapon of such size.

It was designed by the Aircraft Armament Division in the Office of the Chief of Ordnance, for use by the largest bombing aircraft in the attack of naval vessels of the most modern battleship type and in raids against great munition plants. Careful consideration was given to all results obtained in previous experimental work, and in the design are embodied all the latest improvements. Although constructed to penetrate without deformation or fracture the usual targets against which it might be used, it is not constructed to go through heavy armor. In addition to being made strong enough to withstand impact, the case is proportioned to hold as much explosive as possible, for it is mainly upon the amount of explosive carried that the destructive effect of the bomb is dependent. Fuses in the nose and tail of the bomb have been designed to give either instantaneous action or delayed action, permissible delays ranging from a few hundredths of a second up to several seconds. Taken as a whole, the bomb may be considered the most powerful and efficient weapon of its type yet produced.

In the test the bomb was carried in the air by an American-made Handley-Page, and in order that the airplane might lift this great weight it was stripped of all its extra military load, the fuel tanks were but partly filled, and the pilot, bomber, and one mechanician were the only ones allowed to make the flight. Taking off with such a load was in

itself a dangerous venture, and added to this was the hitherto untried experiment of releasing so much weight at one time from an airplane. Capt. Norbert Carolin, the pilot; Sergt. Stewart Smink, the bomber; and Corp. Louis Averitt, the mechanician, deserve great credit for undertaking the initial flight with this bomb.

The observers witnessed the test from the main front of the Proving Ground, about 2000 yards from the point over which the bomb was dropped. As the airplane approached the bomb could be seen very clearly suspended in position under the fuselage, and when released it dropped in perfect flight, nosing down slowly with fins guiding it on its curved path through the air. Asked later concerning the effect of the release, the pilot stated that the airplane shot up about 20 feet, but this was no worse than a bad "bump," often encountered in flying.

When the bomb struck the ground, great masses of earth, debris, and smoke were hurled hundreds of feet in the air, and several seconds later came the tremendous crash of the detonation. A delay of a few hundredths of a second was used to allow the bomb to penetrate the ground to form a crater, thus limiting the distribution of fragments from the bomb case and eliminating the possibility of any one of these fragments being projected as far as the observing party, which might have occurred had an instantaneous fuse been used. The blast from the detonation was largely smothered by the formation of a crater, and some of the observers were disappointed that the effect from the detonation was not appreciably felt, but when the smoke and dust had cleared away the power of the bomb was shown by the immense crater formed. A hole 19 feet deep and 65 feet in diameter was blasted in the earth.—*Army Ordnance,* November, 1921.

SPOTTING INSTRUMENTS.—Orders have been received for the design and manufacture of two artillery spotting instruments for Coast Artillery and two similar instruments for Field Artillery, for test. These instruments will be designed for use by an airplane observer and will permit him to determine immediately and without any calculation, the distance of the fall of a shot from the target, as well as the mathematical bearing of the same relative to the target. This information will be sufficient to enable necessary corrections to be applied at the gun.—*Army Ordnance,* September-October, 1921.

NEW ELECTRIC GUN.—An electric cannon based on the fact that a conductor carrying a current will travel across a magnetic field has been developed by a Frenchman. A model of the gun has been built and gives a muzzle velocity of 200 meters per second to a 50-gram projectile. Since the gun windings are used but a fraction of a second, huge amounts of current can be employed. Further details can be found in the *Revue Generale de l'Electricité.—Tech. Engineering News,* December, 1921.

MISCELLANEOUS

WORLD'S FUTURE OILFIELDS ARE OF VAST AND INCALCULABLE EXTENT.—In a paper on the future oilfields of the world read before the Institute of Marine Engineers, Mr. George Howell said that the vast regions in the environs of the Mackenzie River and other parts of the Dominion of Canada as well as Athabasca and Alberta were known to be more or less petroliferous and well worthy of more intense development. The oil is of a high grade paraffin base in certain regions and of an asphaltic base in others.

In the lower part of California new fields are being opened up every day. The Mid-Continent fields in North America are disclosing new oil sands; some have been discovered at a lower level than the deepest wells

sunk, while in certain other fields valuable intervening oil-containing sands have recently been discovered.

The whole of the northern portion of the Indian Empire is possible for new oil fields; the flanks alone of the Himalayas will afford much to interest the petroleum engineer. Burmah is only in its infancy as an oil producing region.

Afghanistan and Persia are countries practically unexplored in the geological sense for oil. The engineers of the Anglo-Persian Oil Co. have done much to add to our knowledge of future oil supplies, but, comparing the size of the region, the explored area is quite small to what will be disclosed when the more extensive examination of the ground has been undertaken. The south sections of the shore line of the Caspian Sea, particularly in the neighborhood of the Elburz mountains, travelling northwest by way of Enzali, give ample evidence over great tracts of country that they are of a petroliferous character.

Russia's oil futures are vast. Not more than 10 per cent of the petroliferous regions have been worked for oil. The Trans-Caspian provinces, the areas west of Baku, south of Grozni, as well as that in the vicinity of the Black Sea, offer also future fields for the supply of oil.

Additional oil fields are to be found in Colombia, Brazil, Venezuela, the Argentine, Ecuador, Chile, Uruguay, Paraguay, Peru and Guiana. The four first named countries offer substantial possibilities since they include areas in which both geological and structural conditions are suitable for oil accumulation.

If we were to take a retrospective view of the oil fields producing the 100,000,000 tons or more annually of petroleum products which are being consumed to-day, we should find that not more than 10 per cent of the total available supply has been extracted from them. Further, we should ascertain that as a matter of fact, a well drains only one-third of the potential supply, and that under certain conditions the greater part of the remaining two-thirds can be mined by shafts and galleries much in the same way as coal mining. In Pechelbronn, Alsace, from two to five times as much crude oil was extracted by mining in the manner indicated than had already been produced from the same bed by boring.—*Nautical Gazette*, 3 December, 1921.

EXPLOSION IN DUTCH VESSEL.—A serious explosion, due to an accumulation of gas, occurred November 9 in the Dutch submarine *K-4*, in Colombo harbor. The submarine was en route for the Dutch East Indies. Two of the crew were killed and one was injured.—*Naval and Military Record*, 16 November, 1921.

CURRENT NAVAL AND PROFESSIONAL PAPERS

A New System of Ship Construction. *The Shipbuilder*, October, 1921.

The Strategical Aspect of War Against Commerce. *Edinburgh Review*, October, 1921.

The Washington Conference and the Naval Issue. *Fortnightly Review*, November, 1921.

The Scope of Wind Tunnel Research. *Aerial Age Weekly*, 21 November, 1921.

The Several Efficiencies of the Steam Engine. *Power*, 22 November, 1921.

A Simple Method of Finding Steam Consumption of Small Turbines. *Power*, 6 December, 1921.

The Science of Electric Welding. *Journal of Franklin Institute*, November, 1921.

Fog Signalling by Means of Polarised Sound. *The Engineer*, 11 November, 1921.

NOTES ON INTERNATIONAL AFFAIRS

FROM NOVEMBER 10 TO DECEMBER 10

PREPARED BY

PROFESSOR ALLAN WESTCOTT, U. S. Naval Academy

WORK OF WASHINGTON CONFERENCE

NAVAL PROPOSALS.—Under *Professional Notes* in this issue appears in full Secretary Hughes' proposal of November 12, for the cessation of naval construction for 10 years and the reduction of the United States, British, and Japanese navies on a ratio respectively of 5-5-3. On the basis of this plan the American navy would be reduced to 500,650 tons; the British, to 604,450 tons; and the Japanese to 299,700 tons. On the following day Mr. Balfour for Great Britain and Baron Kato for Japan signified "acceptance in principle" of this proposal. Mr. Balfour suggested two modifications: (1) That the submarine tonnage for each nation should be much further reduced and seagoing types for offensive warfare eliminated; (2) that replacement should be gradual year by year in order to maintain naval construction plants. Subsequently Japan urged that she be allowed a proportion of 7 to 10 instead of 6 to 10, and equal tonnage in airplane carriers. When this demand was resisted, she sought compensation in the form of assurances in the Far East. While the French and Italian navies were not at first considered, prospective difficulties appeared in view of the French demand for capital ship tonnage equal to that of Japan and submarine tonnage equal to that of Great Britain. It appeared that Italy would demand a navy equal to that of France, whereas Great Britain would oppose these increases at a time when her own navy was being reduced.

FOUR-POWER AGREEMENT FOR PACIFIC ISLANDS.—It was announced in a plenary session of the Washington Conference on December 10, that the following treaty had been agreed to by Great Britain, the United States, France, and Japan:

Article I.—The high contracting parties agree as between themselves to respect their rights in relation to their insular possessions and insular dominions in the regions of the Pacific Ocean.

If there should develop between any of the high contracting parties a controversy arising out of any Pacific question and involving their said rights which is not satisfactorily settled by diplomacy and is likely to affect the harmonious accord now happily existing between them, they shall invite the high contracting parties to a joint conference to which the whole subject will be referred for consideration and adjustment.

Article II.—If the said rights are threatened by the aggressive action of any other power the high contracting parties shall communicate with one

another fully and frankly in order to arrive at an understanding as to the most efficient measures to be taken, jointly and separately, to meet the exigencies of the situation.

Article III.—This agreement shall remain in force for 10 years from the time it shall take effect, and after the expiration of said period it shall continue to be in force subject to the right of any of the high contracting parties to terminate it upon 12 months' notice.

Article IV.—This agreement shall be ratified as soon as possible in accordance with the constitutional methods of the high contracting parties and shall take effect on the deposit of ratification, which shall take place at Washington, and thereupon the agreement between Great Britain and Japan, which was concluded at London on July 13, 1911, shall terminate.

AGREEMENTS REGARDING CHINA

PRINCIPLES ADOPTED BY POWERS.—*The text of the agreement on general principles to be observed in the investigation regarding China, as subscribed to by the representatives of eight powers in the Committee on Pacific and Far Eastern Questions, was made public on Nov. 21, by Secretary Hughes. It was drafted by Elihu Root, discussed and amended. The text as adopted follows:*

It is the firm intention of the powers attending this conference hereinafter mentioned, to wit, the United States of America, Belgium, the British Empire, France, Italy, Japan, the Netherlands and Portugal:

(1) To respect the sovereignty, the independence and the territorial and administrative integrity of China.

(2) To provide the fullest and most unembarrassed opportunity to China to develop and maintain for herself effective and stable government.

(3) To use their influence for the purpose of effectually establishing and maintaining the principle of equal opportunity for the commerce and industry of all nations throughout the territory of China.

(4) To refrain from taking advantage of the present conditions in order to seek special rights or privileges which would abridge the rights of the subjects or citizens of friendly states and from countenancing action inimical to the security of such states.

CHINESE DEMANDS.—At the opening sessions of the Conference Committee on Far Eastern Affairs the Chinese delegates proposed the following principles to be applied in the determination of questions relating to China:

"1. The powers engage to respect and observe the territorial integrity and political and adminstrative independence of the Chinese Republic. China upon her part is prepared to give an undertaking not to alienate or lease any portion of her territory or littoral to any power.

"2. China, being in full accord with the principle of the so-called open door or equal opportunity for the commerce and industry of all the nations having treaty relations with China is prepared to accept and apply it in all parts of the Chinese Republic without exception.

"3. With a view to strengthening mutual confidence and maintaining peace in the Pacific and the Far East, the powers agree not to conclude between themselves any treaty or agreement directly affecting China or the general peace in these regions without previously notifying China and giving to her an opportunity to participate.

"4. All special rights, privilege, immunities or commitments, whatever their character or contractural basis claimed by any of the powers in or relating to China are to be declared, and all such or future claims not so made known are to be deemed null and void. The rights, privileges, immunities and commitments now known or to be declared are to be examined with a view to determining their scope and validity, and, if valid,

to harmonizing them with one another and with the principles declared by this conference.

"5. Immediately or as soon as circumstances will permit, existing limitations upon China's political, jurisdictional and administrative freedom of action are to be removed.

"6. Reasonable, definite terms of duration are to be attached to China's present commitments which are without time limits.

"7. In the interpretation of instruments granting special rights or privileges, the well-established principle of construction that such grant shall be strictly construed in favor of the grantors is to be observes.

"8. China's rights as a neutral are to be fully respected in future wars to which she is not a party.

"9. Provision is to be made for the peaceful settlement of international disputes in the Pacific and the Far East.

"10. Provision is to be made for future conferences to be held from time to time for the discussion of international questions relative to the Pacific and the Far East, as a basis for the determination of common policies of the signatory powers in relation thereto."

CONCESSIONS TO CHINA.—The Conference Committee on Far Eastern Affairs took the following action in the course of committee meetings up to December 10:

Alien Post Offices Withdrawn.—On November 28, the committee adopted the following resolution :

Recognizing the justice of the desire expressed by the Chinese Government to secure the abolition of foreign postal agencies in China, save or except in leased territories or as otherwise specifically provided by treaty, it is resolved:

"1. The four powers having such postal agencies agree to their abandonment, subject to the following conditions:

"a. That an efficient Chinese postal service is maintained.

"b. That an assurance is given by the Chinese Government that they contemplate no change in the present postal administration so far as the status of the foreign Co-Director General is concerned.

"2. To enable China and the powers concerned to make the necessary dispositions, this arrangement shall come into force and effect not later than (January 1, 1923).

Withdrawal of Foreign Troops Discussed.—In the discussion of the withdrawal of foreign troops it was stated that there were about 5000 foreign troops in China exclusive of Manchuria and Shantung, including about 1500 American, 1000 British, 1200 French, and 1100 Japanese. Japan also had 2800 men in Shantung and her usual forces along the Manchurian railway. Japan declared that she could not consider the removal of these latter troops, since the whole question of Manchuria was determined by the Treaty of Peking in 1905. As regarded forces in China proper, she was willing to withdraw only when conditions warranted. No action was taken by the committee at this time.

Committee to Investigate Judicial System.—On November 29, the committee adopted a resolution to the effect that the powers were willing that political, jurisdictional, and administrative limitations upon China should be removed as soon as circumstances would permit; and that to this end a commission should be created to investigate China's judicial system and report within a year's time, each of the powers being then free to adopt or reject the committee's recommendations in whole or in part.

China's Neutrality to be Respected.—On December 7 a resolution was adopted, that "China's rights as a neutral are to be fully respected in future wars to which she is not a party." China had called attention to violations in the Russo-Japanese War and in the Japanese capture of Kiao-Chau.

Wireless Stations.—On December 7 it was agreed that legation wireless stations in China should send only official messages, and that China should be permitted to purchase all wireless stations established in her territory without her consent.

Treaties to Respect Chinese Sovereignty.—On December 8 the committee took up point 3 of the Chinese proposals to the effect that China should be notified of and allowed to participate in any treaty or agreement affecting her. After some discussion the following resolution was adopted:

That the powers attending this conference, hereinafter mentioned, to wit, the United States of America, Belgium, the British Empire, China, France, Italy, Japan, The Netherlands and Portugal declare that it is their intention not to enter into any treaty, agreement, arrangement or understanding, either with one another or individually or collectively with any power or powers, which would infringe or impair the principles which have been declared by the resolution adopted November 21 by this committee."

Chinese Finances.—The question of China's finances was referred to a sub-committee. China requested that she be allowed to raise to 12½ per cent the import tariff of 5 per cent to which she has been hitherto limited by international agreement. She also requested removal of the restrictions which required the deposit of most of her revenues in foreign banks, to insure payment on loans. Sir Robert Borden made the proposal that a duty of 7½ per cent *ad valorem* be permitted. Japan, however, objected to an immediate decision, declaring that the tariff question was too intricate for off-hand settlement, and pointing out that one third of her foreign trade was with China.

Evacuation of Leased Territory.—Regarding the evacuation of Chinese territory held by foreign powers, France made and later withdrew a conditional offer to give up the unimproved harbor on the coast of Kwangtung which she acquired in 1899. England offered to turn over Wei-hai-Wei, but insisted on the retention of the Kowloon territory as a protection for Hong Kong. Japan repeated her previous offers regarding Shantung, but indicated her intention to retain her holdings in Manchuria. The question of leased territories was left for further discussion.

SEPARATE NEGOTIATIONS ON SHANTUNG.—Acting upon the suggestion of the United States and Great Britain, Japan and China on November 30 agreed to begin direct conversations on the Shantung question, Secretary Hughes and Mr. Balfour offering their good offices in the effort to reach a solution. After meeting on the following day, the delegates of both powers issued statements presenting their respective views of the question. The Japanese statement read in part:

We are not unmindful of the difficulties with which the Chinese Government is being confronted in entering into direct negotiations on the subject.

We are, however, confident that, if approached from a broader perspective, the question should be susceptible of a speedy solution. The true and vital interests of the two nations are in no way conflicting.

It is unfortunate that the real issues involved have been very largely misunderstood in the popular mind. The term "Shantung Question" is itself a misnomer. The question is not one which affects the whole Province of Shantung. The important points now awaiting adjustment relate only to the manner of restoring to China an area of territory, less than one-half of 1 per cent of the Shantung Province, and also to the disposition of a railway 290 miles long, and its appurtenant mines, formerly under exclusive possession and management of the Germans. There is absolutely no question of full territorial sovereignty; that is being exercised by China throughout the length and breadth of the Province.

GREAT BRITAIN

FREE IRISH STATE.—Following the refusal of the Ulster Government in November to accept union with Southern Ireland on the basis of an all-Ireland Parliament and other terms proposed by the Sinn Fein, the British Government renewed its efforts to secure modified terms from the Sinn Fein delegates in London. On December 6 an agreement was reached, signed, and published, to go into effect in Southern Ireland upon ratification by the British and by the Southern Irish parliaments. These parliaments were at once called into special session for the purpose of considering the treaty. The Irish Cabinet disagreed over its adoption, Mr. de Valera and two other members declaring themselves opposed.

Unless the Ulster Government makes objection within a month's time, the agreement would also go into effect for Northern Ireland. But the latter retained the right to remain a separate government under the terms of the Government of Ireland Act of 1921, and it appeared likely that this would be Ulster's choice. The text of the treaty follows:

Article I.—Ireland shall have the same constitutional status in the community of nations known as the British Empire as the Dominion of Canada, the Commonwealth of Australia, the Dominion of New Zealand and the Union of South Africa, with a Parliament having powers to make laws for peace and order and good government in Ireland, and an executive responsible to that Parliament, and shall be styled and known as the Irish Free State.

Article II.—Subject to provisions hereinafter set out, the position of the Irish Free State in relation to the Imperial Parliament, the Government and otherwise shall be that of the Dominion of Canada, and the law, practice and constitutional usage governing the relationship of the Crown or representative of the Crown and the Imperial Parliament to the Dominion of Canada shall govern their relationship to the Irish Free State.

Article III.—A representative of the Crown in Ireland shall be appointed in like manner as the Governor General of Canada and in accordance with the practice observed in making such appointments.

Article IV.—The oath to be taken by the members of the Parliament of the Irish Free State shall be in the following form:

"I do solemnly swear true faith and allegiance to the Constitution of the Irish Free State as by law established, and that I will be faithful to his Majesty King George V, and his heirs and successors by law, in virtue of the common citizenship of Ireland with Great Britain and her adherence to and membership of the group of nations forming the British Commonwealth of Nations."

Article V.—The Irish Free State shall assume liability for service of the public debt of the United Kingdom as existing at the date thereof and toward the payment of war pensions as existing on that date in such proportion as may be fair and equitable, having regard for any just claims on the part of Ireland by way of set-off or counter-claim, the amount of such sums being determined, in default of agreement, by the arbitration of one or more independent persons being citizens of the British Empire.

Article VI.—Until an arrangement has been made between the British and Irish Governments whereby the Irish Free State undertakes her own coastal defense, defense by sea of Great Britain and Ireland shall be undertaken by his Majesty's imperial forces, but this shall not prevent the construction or maintenance by the Government of the Irish Free State of such vessels as are necessary for the protection of the revenue or the fisheries. The foregoing provisions of this article shall be reviewed at a conference of representatives of the British and Irish Governments to be held at the expiration of five years from the date hereof with a view to the undertaking by Ireland of a share in her own coastal defense.

Article VII.—The Government of the Irish Free State shall afford to his Majesty's imperial force (a) in time of peace such harbor and other facilities as are indicated in the annex hereto, or such other facilities as may from time to time be agreed between the British Government and the Government of the Irish Free State, and (b) in time of war or of strained relations with a foreign power such harbor and other facilities as the British Government may require for the purposes of such defense, as aforesaid.

Article VIII.—With a view to securing observance of the principle of international limitation of armaments, if the Government of the Irish Free State establishes and maintains a military defense force, the establishment thereof shall not exceed in size such proportion of the military establishments maintained in Great Britain as that which the population of Ireland bears to the population of Great Britain.

Article IX.—The ports of Great Britain and the Irish Free State shall be freely open to the ships of the other country on the payment of the customary port and other dues.

Article X.—[This merely provides compensation by Great Britain or Ireland for discharged officials and constabulary.]

Article XI.—Until the expiration of one month from the passing of the Act of Parliament for the ratification of this instrument, the powers of the Parliament and Government of the Irish Free State shall not be exercisable as respects Northern Ireland, and the provisions of the Government of Ireland Act of 1920 shall, so far as they relate to Northern Ireland, remain of full force and effect, and no election shall be held for the return of members to serve in the Parliament of the Irish Free State for the constituencies of Northern Ireland unless a resolution is passed by both houses of Parliament of Northern Ireland in favor of holding such elections before the end of the said month.

Article XII.—If before the expiration of said month an address is presented to his Majesty by both houses of Parliament of Northern Ireland to that effect, the powers of the Parliament and Government of the Irish Free State shall no longer extend to Northern Ireland, and the provisions of the Government of Ireland Act of 1920 (including those relating to the Council of Ireland) shall, so far as they relate to Northern Ireland, continue to be of full force and effect, and this instrument shall have effect, subject to the necessary modifications;

Provided, that if such an address is so presented, a commission consisting of three persons, one to be appointed by the Government of the Irish Free State, one to be appointed by the Government of Northern Ireland, and one, who shall be chairman, to be appointed by the British

Government, shall determine in accordance with the wishes of the inhabitants, so far as may be compatible with economic and geographic conditions, the boundaries between Northern Ireland and the rest of Ireland, and for the purposes of the Government of Ireland Act of 1920, and of this instrument the boundary of Northern Ireland shall be such as may be determined by such commission.

Article XIII.—For the purpose of the last foregoing article the powers of the Parliament of Southern Ireland under the Government of Ireland Act of 1920, to elect members of the Council of Ireland, shall after the Parliament of the Irish Free State is constituted, be exercised by that Parliament.

Article XIV.—After the expiration of said month, if no such address as mentioned in Article XII, hereof is presented, the Parliament of the Government of Northern Ireland shall continue to exercise as respects Northern Ireland the powers conferred upon them by the Government of Ireland Act of 1920, but the Parliament of the Government of the Irish Free State shall in Northern Ireland have in relation to matters, in respect of which the Parliament of Northern Ireland has not the power to make laws under that act (including matters which, under said act, are within the jurisdiction of the Council of Ireland), the same powers as in the rest of Ireland, subject to such other provisions as may be agreed to in the manner hereinafter appearing.

Article XV.—At any time after the date hereof the Government of Northern Ireland and the Provisional Government of Southern Ireland, hereinafter constituted, may meet for the purpose of discussing provisions, subject to which the last of the foregoing article is to operate in the event of no such address as is therein mentioned being presented, and those provisions may include: (a) Safeguards with regard to patronage in Northern Ireland; (b) safeguards with regard to the collection of revenue in Northern Ireland; (c) safeguards with regard to import and export duties affecting the trade and industry of Northern Ireland; (d) safeguards for the minorities in Northern Ireland; (e) settlement of financial relations between Northern Ireland and the Irish Free State; (f) establishment and powers of a local militia in Northern Ireland and the relation of the defense forces of the Irish Free State and of Northern Ireland, respectively, and if at any such meeting provisions are agreed to the same shall have effect as if they were included among the provisions subject to which the powers of Parliament and of the Government of the Irish Free State are to be exercisable in Northern Ireland under Article XIV, hereof.

Article XVI.—Neither the Parliament of the Irish Free State nor the Parliament of Southern Ireland shall make any law so as either directly or indirectly to endow any religion, or prohibit or restrict the free exercise thereof, or give any preference or impose any disability on the account of religious belief or religious status, or affect prejudicially the right of any child to attend school receiving public money without attending the religious instruction of the school, or make any discrimination as respects state aid between schools under the management of the different religious denominations, or divert from any religious denomination or any educational institution any of its property except for public utility purposes and on the payment of compensation.

Article XVII.—By way of provisional arrangement for the administration of Southern Ireland during the interval which must elapse between the date hereof and the constitution of a Parliament and a Government of the Irish Free State in accordance therewith, steps shall be taken forthwith for summoning a meeting of the members of Parliament elected for the constituencies in Southern Ireland since the passing of the Government of Ireland Act in 1920 and for constituting a provisional government. And the British Government shall take steps necessary to transfer to such provisional government the powers and machinery requisite for the dis-

charge of its duties, provided that every member of such provisional government shall have signified in writing his or her acceptance of this instrument. But this arrangement shall not continue in force beyond the expiration of twelve months from the date hereof.

Article XVIII.—This instrument shall be submitted forthwith by his Majesty's government for the approval of Parliament and by the Irish signatories to a meeting summoned for the purpose of members elected to sit in the House of Commons of Southern Ireland, and, if approved, it shall be ratified by the necessary legislation.

Signed on behalf of the British delegation: *Lloyd George, Austen Chamberlain, Birkenhead, Winston Churchill, Worthington-Evans, Hamar Greenwood, Gordon Hewart.*

On behalf of the Irish delegation: *Art of Griobhtha (Arthur Griffith), Michael O. O. Sileain (Michael Collins), Riobard Bartun (Robert C. Barton), E. S. Dugan (Eamon J. Duggan), Seorsa Ghabgain Ui Dhubhthaigh (George Gavan Duffy).*

Dated the 6th of December, 1921.

ANNEX

An annex is attached to the treaty. Clause 1 specifies that Admiralty property and rights at the dockyard port of Bellehaven are to be retained as at present date and the harbor defenses and facilities for costal defense by air at Queenstown, Belfast, Lough and Loughswilly to remain under British care, provision also being made for oil, fuel and storage.

Clause 2 provides that a convention shall be made between the two governments, to give effect to the following conditions: That submarine cables shall not be landed or wireless stations for communication with places outside of Ireland established, except by agreement with the British Government, that existing cable rights and wireless concessions shall not be withdrawn except by agreement with the British Government, and that the British Government shall be entitled to land additional submarine cables or establish additional wireless stations for communication with places outside of Ireland, that lighthouses, buoys, beacons, etc., shall be maintained by the Irish Government and not be removed or added to except by agreement with the British Government, that war signal stations shall be closed down and left in charge of care and maintenance parties, the government of the Irish Free State being offered the option of taking them over and working them for commercial purposes, subject to Admiralty inspection, and guaranteeing the upkeep of existing telegraphic communication therewith.

Clause 3 provides that a convention shall be made between the two governments for the regulation of civil communication by air.

EGYPT OBJECTS TO BRITISH TERMS.—Negotiations in London for the freeing of Egypt along the lines suggested by the Milner Commission, were held up by the refusal of the Egyptian Premier, Sir Adly Yeghen Pasha, to accept the British proposals. The objections were chiefly: (1) That Egypt was not permitted to enter into agreement with foreign nations without British approval; (2) that British troops were not to be confined to the zone of the Suez Canal.

In his report of the negotiations, published in November, the British High Commissioner, Lord Allenby, called attention to the great importance of Egypt on the main line of communications with the East. The immunity of Egypt from the dominant influence of any other great power he there-

fore declared to be of primary importance to India, Australia, New Zealand, and all other British eastern colonies, affecting the safety of nearly 350,000,000 British subjects.

ANGLO-AFGHAN TREATY.—Negotiations by Sir Henry Dobbs in Kabul, which had continued since January, 1921, were concluded in November by a treaty, signed but not finally ratified, covering the following points: (1) Britain recognizes the complete independence of Afghanistan. (2) Both countries accept the existing Anglo-Afghan frontiers, and each agrees to notify the other before entering upon military operations necessary for maintaining order among border tribes. (3) There is no mention of the former British subsidy to the Ameer of Afghanistan, but Afghanistan is given the privilege of importing arms and munitions through India without duties or other hindrance. (4) Russian consulates are abolished in the three Afghan districts on the India frontier.

The last point will in some measure protect India against Soviet intrigue, though the Soviet mission remains at Kabul and the Russian subsidy is presumably continued. Together with the recantation of Mahatma Gandhi, the Indian agitator, and the visit of the Prince of Wales, the Afghan pact is expected to lighten British problems in India.

LORD NORTHCLIFFE ON AUSTRALIA'S DANGERS.—"One can almost smell the East on your northern winds, and yet I have met scarcely a score of men and women in Australia with any sense of the imminent danger in which their country stands," declared Lord Northcliffe, the English newspaper owner, in an interview given to the daily press before his departure from Australia. He warned Australia that only numbers could save her.

"This great empty continent is set in a world which (natural) science and engineering make every day smaller. Australia's magnitude and riches and the weakness of its garrison are known to all the overcrowded, ambitious nations in the near north. Probably governments which circumstance may one day make hostile to the Commonwealth, know more about the possibilities of this country as a home for scores of millions of people than is known by most Australians. Australians do not seem properly awake to the fact that they live in an age which has lately proved itself to be not distinguished by respect for international rights. To-day moral right to territory is in itself no right at all. Moral right must be based upon capacity in arms. Among people of relatively equal individual fighting strength, capacity in arms is measured by numbers, and by this standard Australia's present position and immediate future are precarious.

"I am deeply impressed by your magnificent natural riches," continued Lord Northcliffe, "but I leave lovely Australia haunted and saddened by thoughts of your weakness. I am amazed at your indifference to events and portents in the outside world and especially in Asia. Within a fortnight's steam of your Commonwealth you have thousands of millions of people, all of whom are crowded and restless and some of whom are ambitious and powerful. Yet you go about your work and play as though lust for territory had not all down the centuries been the cause of war, and as though the history of the world had not been the story of the overthrow of the weak by the strong."

"The key to your White Australia ideal—the sure parent of all your ideals—is population. You must increase your slender garrison by the multiplication of your people. Only numbers will save you. The world

will not tolerate an empty and idle Australia. This continent must, like the other continents, carry its full quota of people and do its full share of production. You must take immigrants—the right kind of immigrants, immigrants not for the towns, but for the empty spaces. You have no option. Tens of millions will come to you whether you wish it or not. You cannot hold up a human flood by a restriction clause in an act of Parliament."

On the one hand there was "the one sure parent of all the future greatness of Australia," immigration, almost entirely neglected; on the other hand the public mind was filled with the proposed convention to consider amendments to the Constitution, with the standardization of the railway gauge, improved communications, the revision of the tariff, a basic wage, fair prices courts, the promotion of state lotteries, and the control of pedestrian traffic in the streets. A bold, constructive immigration policy, establishing within two or three years a flow of at least 100,000 people a year to the Commonwealth, with a rapid increase to 250,000, was urged by Lord Northcliffe, who said that the outstanding facts to-day were: Australia must have the people; the people are available: Australia can absorb and prosper them, and their coming will profit all classes in the country. Immigration was a "nightmare to public men in Australia" only because it was being conducted on tinkering feeble lines.

"What is clearly and urgently needed," Lord Northcliffe sums up, "is a great development scheme, which will insure over, say 25 years:

"1. More work than can be done by workers already in Australia;

"2. More land available for settlement by new farmers than can be taken up by land seekers already in Australia;

"3. Greatly increased production, which will mean more work, more prosperity."

GERMANY

REPARATIONS DISCUSSIONS IN LONDON.—The Allied Reparations Commission in November sent a note to the German Government requesting that measures be taken at once to assure the reparations payments due in January and February.

Following the much-discussed visit to London of the German financier Stiness, the former German Reconstruction Minister Herr Rathenau spent several days there in December. It was stated that he had gained no material concessions regarding reparations, but had paved the way for the resumption of banking transactions between England and Germany. A meeting of Allied Premiers for consideration of the reparations question was planned for the near future.

JANUARY PAYMENTS ASSURED.—Berlin, December 9.—Germany's reparation riddle is nearing a solution. It is certain tonight that Germany can and will meet the next reparation payment of 500,000,000 gold marks on January 15. Thereby a new factor of stability will have been injected into the critical financial situation.

Germany is still short 270,000,000 gold marks to make up the 500,000,000 of the January quota. In other words the Reichsbank has in hand approximately 230,000,000 gold marks worth of dollars and other foreign exchange available for turning over to the Allies. The Reichsbank must now scratch around to try to raise the balance of 270,000,000 gold marks by January 14, but if the worst came to worst, the Reichsbank could still tap its gold reserve to make the January reparation payments which is thus assured,

even if Germany is unsuccessful in floating loans between now and January 15.

While the centre of gravity in the reparation problem still lies in Paris important decisions are shaping here. There is an absolute determination not to fall down on the January and February payments, the determination being inspired by a wholesome fear that the French would seize the opportunity offered by default to occupy the Ruhr region.—*N. Y. Times*, 10/12.

BALKANS AND NEAR EAST

PROTECTION FOR ALBANIA.—At the request of Great Britain, the hostilities along the Albanian frontier between Albanian and Jugoslavia were taken up by the Council of the League of Nations as a menace to international peace. At the hearing representatives of both nations pledged their governments to accept and respect the frontier laid down by the Allied Powers. A protocol to this effect was signed on November 18.

BRITISH OBJECT TO FRANCO-TURKISH PACT.—During November there was further exchange of notes between France and Great Britain regarding the agreement between France and the Turkish Nationalists. The French evacuation of Cilicia, provided for in this agreement, not only opened the right flank of the Greek army to Turkish attack and turned over to the Turks the French matériel and munitions, but also placed the Armenians and Greek Christians of the district at the mercy of the Turks.

In a note dated November 29, the British Government made inquiries regarding the provisions made for protection of minorities in the territory surrendered by France, and signified its intention to send a naval vessel to Mersina for the protection of British residents. Following the interchange of notes there was a prospect that the Near Eastern question would again be taken up by the Allied Powers, with the object of mediating between Greeks and Turks and reaching a general settlement in Asia Minor.

RUSSIA

FRANCE AGAINST RELATIONS WITH SOVIETS.—Paris, France, November 23.—A French note has been sent to London on the subject of Russian pre-war debts. It recalls that France has already explained why it appears to her vain and dangerous to renew relations, even economic, with the Bolsheviki. This attitude is in conformity with that of America as defined in January, 1921.

In Mr. Tchitcherin's note, the recognition of debts is taken as a basis for bargaining and France refuses to admit such a proceeding. Moreover, Mr. Tchitcherin does not speak of war debts, nor of loans to societies whose possessions the Soviets have confiscated. Fundamental guarantees which would justify any kind of recognition of the Moscow Government, are not furnished. Only when they are, can France examine the possibility of pourparlers.—*Chris. Sci. Monitor*, 23/11.

ALAND ISLANDS DICISION PROTESTED.—Stockholm, Sweden, Nov. 22.—George Tchitcherin, the Soviet Foreign Minister, has addressed a note to Hjalmar Branting, the Swedish Premier, stating that the Soviet Government cannot recognize the agreement of October 20, regarding the

Aland Islands as, owing to the importance of the islands to Russia on account of their geographical position, no change in their juridical status can be countenanced.

The note continues that the action of the Swedish Government in taking part in said agreement will be considered a hostile action against Russia's interests.

JAPAN AND FAR EAST

CHANGES IN GOVERNMENT.—On November 12 Baron Koreldyo Takahashi, Minister of Finance in the Hara Cabinet, was named premier to succeed former Premier Hara. Baron Takahashi was a close friend and political adherent if his predecessor, and is one of Japan's most prominent financiers. There were no other cabinet changes, Baron Takahashi retaining his post as Minister of Finance, Uchido of Foreign Affairs, and Kato of the Marine.

On November 25 the Emperor Yoshito of Japan withdrew from official duties owing to protracted illness, and named Crown Prince Hirohito to assume the duties of regent.

JAPAN AND FAR EASTERN REPUBLIC.—Peking, China.—The conference now in session at Dairen between representatives of Japan and of the Chita Government attracts more public interest here than the previous negotiations between Mr. Yourin and the Chinese Foreign Office. It has become known that the most delicate point in the negotiations is the question of the Japanese occupation of Northern Saghalien. Japan bases her extensive occupation of the northern portion of this land upon military necessity growing out of the Nikolaivsk incident. It is understood that the Chita representative is insisting that Japanese occupation preceded that incident and that after it the Japanese extended their authority and seized other valuable assets.

As a matter of fact the wholesale massacre of the Japanese garrison at Nikolaivsk in the spring of 1920 was carried out by an irresponsible mob of aggrieved Russians who found their means of livelihood threatened by the Japanses occupation of the valuable fisheries at the mouth of the Amur river, where Nikolaivsk is located, as well as by the Japanese seizure of all the fishery rights north of Vladivostok.

It is known here that it was not until after the incident that formal possession was taken although previous to it the Japanese had assumed the rôle of domination. The formal declaration of seizure was followed by the setting up of a Japanese municipality, the changing of the names of the streets to Japanese names, the exploitation of mines and forests and the importation of such a large number of Japanese workmen that it resulted in a congestion of labor. At the time of the occupation Japan announced that its object was to hold the area until Japan's honor and dignity could be satisfied by satisfactory settlement of the Nikolaivsk affair.

When the Chita Government asked that the Japanese troops should be withdrawn from Siberia as a preliminary to the signing of a trade agreement, Japan hesitated to act under a poorly concealed threat. It countered the claim by insisting that the Chita Government should render satisfaction to Japan for the Nikolaivsk incident but Chita replied that its government was not in existence at the time of the Nikolaivsk massacre and that it could not therefore be held responsible for incidents which occurred before its organization. Chita further stated that under no circumstances can consent be given to the occupation or annexation of Russian soil by Japan.—*Christian Science Monitor*, 25/11.

LATIN AMERICA

GUATEMALA REVOLUTION.—Guatemala City, Guatemala, Dec. 8 (Associated Press).—General Orellana, Chief of Staff of the Guatemalan Army, to-day was elected Provisional President of the Republic to take the place of Carlos Herrera, who was overthrown early in the week.

The National Assembly convened this afternoon, despite the protest of Representative Silva Pera against the constitutionality of such action.

The French, Spanish and Mexican Ministers to-day paid a visit to the de facto Government officials. They then visited former President Herrera and former Minister of Foreign Affairs Luis Aguirre, who are under detention. The de facto Government has promised to treat the prisoners with every consideration and to accord them judicial trials.

Benton McMillin, the American Minister, in an interview to-day, declared that he had declined to join the other ministers in their visit to the de facto government. He added that, according to custom, he would take no steps of any kind toward the de facto Government that might be construed as recognition of it until he was instructed so to do by the government at Washington.

Twenty-five persons were killed inside the city on Tuesday morning during the overthrow of the government. According to an official report, ten of the killed were city police.

REVIEW OF BOOKS

"Universe." By Scudder Klyce. $2.00 plus postage. (Printed and published by S. Klyce, Winchester, Mass.)

The advertisement of this book as "a verifiable solution of the "Riddle of the Universe" is not written with the same rigorous explicitness that characterizes the book itself.

What is the "Riddle of the Universe"? The great majority would unhesitatingly say that "riddle" should be plural as there are many riddles which intelligent human beings are attempting to solve with more or less success each day.

With hesitation the writer submits that the riddle which the author had in mind was the distinction which exists in its utmost plentitude in all knowledge; *i. e.*, the distinction between the knowledge of an individual acquired from his experience and its valid expression as (common) knowledge.

All men acquire knowledge to a greater or less degree based on their experience. To make this knowledge available to others or to record it for their own future use, requires that they express it or record it in some manner. In so far as they approach absolutely exact and consistent expression, their knowledge becomes universal; and in so far as they fail, others are confounded and confused with variations which they cannot correlate. To so express knowledge that another, familiar with your expression, will get your exact ideas, is one of the most, if not the most, difficult arts in the world.

To summarize the "Universe" of (325,000 words) in a short review is impossible. The best that can be done is to touch on a few features of common interest.

It is always of interest in the consideration of a book of this type to know why it was written. How was the attention of the author first drawn to his subject? Why did the author devote years of labor and study to writing such a book?

Here is the author's statement as given in an interview published in the *Public Ledger* of Philadelphia on 30 November:

"I started out on the study that led to the book because it angered me in school not to understand things. There were many things I wanted to know that no one would explain and so when I was writing the book I hoped it might explain some of those things that made me so indignant and impatient. Now I am interested in seeing what happens, whether any of the experts will go for me. There is a heavy responsibility in having no one to edit your work. Perhaps I have made errors. And certainly

my unifications of knowledge cannot be final. But it will be interesting to see what my book does."

From this statement it appears that the author found that in acquiring knowledge he frequently could not understand its expression. And, since there was in certain fields of knowledge, uniform expression, the legitimate conclusion which the author reached and which appears to be in accordance with "common sense" was that the method of expression itself was faulty, and it was with this idea that the "Universe" was written.

A comparison of the author's experience, with previous experience along similar lines, would be interesting. "The Epistle to the Reader" in Locke's "Essay on the Human Understanding" reads as follows:

"Were it fit to trouble thee with the history of this Essay, I should tell thee, that five or six friends, meeting at my chamber, and discoursing on a subject very remote from this, found themselves quickly at a stand by the difficulties that rose on every side. After we had awhile puzzled ourselves, without coming any nearer a resolution of those doubts which perplexed us, it came into my thoughts, that we took a wrong course; and that, before we set ourselves upon inquiries of that nature, it was necessary to examine our own abilities, and see what objects our understandings were not fitted to deal with. This I proposed to the company, who all readily assented; and thereupon it was agreed, that this should be our first inquiry.

"The commonwealth of learning is not at this time without master-builders, whose mighty designs in advancing that science will leave lasting monuments to the admiration of posterity: But every one must not hope to be a Boyle or a Sydenham; and in an age that produces such masters as the great Huygenius, and the incomparable Mr. Newton, with some other of that strain, it is ambition enough to be employed as an under-labourer in clearing the ground a little, and removing some of the rubbish that lies in the way to knowledge; which certainly had been very much more advanced in the world, if the endeavours of ingenious and industrious men had not been much cumbered with the learned but frivolus use of uncouth, affected, or unintelligible terms introduced into sciences, and there made an art of to that degree, that philosophy, which is nothing but the true knowledge of things, was thought unfit or uncapable to be brought into well-bred company and polite conversation.

"I know there are not words enough in any language to answer all the variety of ideas that enter into men's discourses and reasonings. But this hinders not but that when any one uses any terms, he may have in his mind a determined idea which he makes it the sign of, and to which he should keep it steadily annexed during that present discourse. Where he does not or cannot do this, he in vain pretends to clear or distinct ideas; it is plain his are not so; and therefore there can be expected nothing but obscurity and confusion, where such terms are made use of which have not such a precise determination."

It would be interesting to know who the five or six friends were who met with Locke and were responsible, in part, for his essay. We know that Locke was more or less intimate with Wren, Hooke, Boyle, Huygens,

Desaguilers, and last but not least, Sir Isaac Newton himself. If such a company had difficulty in discussion it is apparent that the art of expression is most difficult.

Knowledge is a record of experience or experiments. As an individual is an accurate, exact observer and experimenter, his knowledge (un-expressed but recorded in his mind) is exact and accurate. When knowledge is expressed by individuals, using words and symbols, common to all and consistent with themselves, knowledge is universal. Faulty expression results in confusion. A real unification of knowledge is impossible without a rigorous, exact and common method of expression.

Mr. Klyce makes the theory of language or formal unification, Part I of this book.

We may be pardoned for quoting a few paragraphs which "express all the real argument of this book" as follows:

"SEC. 12. (c) So we start with merely the general form of statement, in an abbreviated form: $2+3=5$. In the first member of that, we have *two parts*, '2' and '3.' *I. e.*, the first member implicitly asserts that there are *two* collections of things, which collecions are at least *verbally separate*. The last member implicitly asserts that there are *not* two collections of things, but that there is one collection *not* verbally separate. In short, so far as *form* or *language* is concerned, the last member *formally contradicts the first*. Hence, in our typical sentence, we say a thing is so; and then promptly, and as a part of the very same sentence, say it is not so.

"(d) Well; by all conventional views of logic or 'reason' our typical sentence is thus verbally or formally positively and completely illogical and irrational, as it says one thing and then at once says it is not true—as it flatly contradicts itself. But by ordinary commonsense—by direct observation or experience—we know that the typical sentence is correct or true. In fact, a proverbial symbol for obvious truth is the statement $2+2=4$; and I should have used that, except we needed to distinguish one 2 from the other 2, and it is hence rhetorically less awkward to use $2+3$.

"(e) Therefore, we simply use observation or 'common-sense,' and conclude that orthodox logic or reasoning is wrong, because $2+3=5$ is correct. Then we further conclude, as being the total essential of a valid logic, that in any sentence—*i. e.*, completely stated and *intelligible* sentence—which is not a truism of the form $A=A$, we *must* have a formal or verbal 'contradiction,' in the respect that *parts* are asserted both to be *parts* and *also* to be combined into a *whole* which is not *parts*. In fact, we may readily see that to make such a 'contradiction' is the whole purpose and use of language:—to combine parts into a whole: to make names of parts coalesce into a formal unit that *means* the whole. That states the essential of language and the whole verbal trick. We apply that trick and thus unify knowledge, by adhering to the simple rule:—make sure that the valid—or 'rational,' or 'true'—sentence does contain such a formal contradiction; if it does not, and is not a truism, it is really nonsense.

SEC. 13. (a) That is the sum total of the essentials of valid logic, and it implicitly contains the solutions of all qualitative problems. The last three paragraphs express all the real argument of this book, and there is nothing in all of knowledge any more difficult to understand than those simple observations. The reader knows that logic already. He uses it daily, as 'commonsense,' without even having to 'think' about it. He is so expert at it that he would find difficulty in saying how he does it, just as he would find (perhaps much less) difficulty in stating precisely what motions he makes in putting on his clothing. Below in this book I merely point out the details of that familiar logic, and the reader verifies them by his own observation and discovers that he knows all answers to questions of principle."

To the reviewer a unit of knowledge is an idea. A unit of language is a word, or a symbol, or any combination of these units used in expressing an idea. Now when an individual wishes to visibly or orally express an idea in language he must use units of language, which *per se* must express common knowledge (common ideas). He may do it consciously with rigorous exactness or he may unconsciously consider the knowledge or environment of the recipient and omit certain parts (of a completely stated, intelligible idea) as being known to the recipient. However, the new idea is the One idea or, the one, made up of common ideas or parts, the Many, and the relationship between the parts.

Valid logic, or expression is to go from the known to the unknown: From the parts or the many ideas (common knowledge) and their relationship (known or accepted) to the one idea (known to the teacher). This is the unification of knowledge.

The expression of knowledge in valid logic is a step by step process. At no time in the process must contact with the parts and relationships, *i. e.* (common knowledge) of the recipient or recipients be lost. If such contact is lost it will be found that "commonsense" is also lost or missing or unavailable. The result being that that expression of knowledge is unintelligible in so far as the recipient is concerned, *i. e.* (the expression is nonsense).

From this it follows that every new idea (completely expressed and intelligible) must consist of at least two factors (common ideas) and a relationship. The valid expression so constructed, expresses the new idea in understandable language to all individuals who are familiar with the factors (common idea) and the relationship. This is the understanding the reviewer has of what the author calls the sum total of the essentials of valid logic.

Only such persons as are familiar with the parts (*i. e.* common ideas or the many) and know from their experience of the relationship, can understand the new idea or one or meaning.

Faraday in a lecture on the "Conversion of Force" says:

"Doubtful as I ought to be of myself, I am certainly very glad to feel that my convictions are in accordance with Newton's conclusions. At the same time, those who occupy themselves with such matters ought not to

depend altogether upon authority, but should find reason within themselves after careful thought and consideration, to use and abide by their own judgment. Newton himself while referring to those who were judging his views, speaks of such as are competent to form an opinion on such matters and makes a strong distinction between them and those who were incompetent in the case."

The "Universe" has three prefaces by men of wide reputation.

Mr. John Dewey has written a preface to the "Universe" and states in part:

"Mr. Klyce has taken commonsense in its radical and simplest form, the form of stating or making anything known. He has himself pointed out the reason why his thought is not always easy to follow. The most difficult thing in the world to learn to see is the obvious, the familiar, the universally taken for granted. Taken as a sketch of a certain way of discovering the meaning of knowledge in general and in its typical branches, Mr. Klyce's book is remarkable, noteworthy. If experts in various lines shall find his special results as fruitful, as illuminating, as his general treatment of knowledge and technical philosophy has been to me, the remark just made will turn out to be altogether too moderate."

David Starr Jordan says in part:

"Mr. Klyce makes no attempt to solve any scientific problem by pure reason, but he would have us make rational use of the knowledge we possess. As to fundamental coordination of all which exists, known or unknown, any consistent use of the word Universe implicitly asserts it. Man himself is able with fair success to make his way in the cosmos; obviously then he is not utterly alien. Not only does his continued existence prove him not alien, but furthermore, by taking thought, he can make headway against the forces of nature and thus in some degree shape his own career. A similar line of argument is shown to apply to every concrete thing of which we are cognizant. The burden of disproof of Mr. Klyce's thesis lies on him who, within the confines of the Universe, can conceive anything—matter, spirit, life, space, or times, which lies outside it."

Mr. Morris Llewellyn Cooke comments in part as follows:

"Of course a great industry will only result from the activities of great men. Most industrial leaders impress us as being literally worn out fighting against a flood of isolated facts and ideas. We need the unifying thought of this book. To be effective we need above all to make our lives simple. Men vary in their mental capacity, but it is undoubtedly true that some men with great capacities are not the match for men of ordinary abilities who "see life steadily and see it whole." I will be much surprised if to most men a reading of "Universe" will not make the struggle a far simpler matter than it usually seems to be.

"But a science that is unrelated is even more fearsome than an industry that is detached from life. Hence our obligation to the author for a master generalization in which science is made to seem but another manifestation of that Ultimate Reality to which the human spirit itself is kinsman."

"The Universe" demonstrates that "There is no exact science." At first such a statement strikes the reader as questionable and not demonstrable. However, after due consideration of the illustrations which the "Universe" supplies copiously from the reader's experience, such an offhand opinion can be revised. Any engineer or scientist who has been engaged in the practice of his profession very soon realizes that absolute exactness is unattainable. Experience is his great teacher. Approximations based on his experience give him a useable solution of his problems rather than a dependence upon theory which to the unexperienced, means absolute and exact science.

For instance, a diameter and a circumference of a circle are two factors (common ideas). The new idea is the measurement of their length. The relationship is their relative length.

If the diameter is taken as the unit (or any even number of units) of measurement it is apparent that the length of the circumference in terms of that unit cannot be exactly expressed numerically regardless of how many figures are added to our numerical relationship 3.1415+, and vice versa for the expression of the length of the diameter in terms of the length of the circumference.

Measurement of linear dimensions should certainly be an exact science if such is possible but it is not only practically impossible to obtain perfect accuracy but it is theoretically impossible. Although for all purposes approximations are used in valid science which are satisfactory. This is the distinction between an exact and valid science as I understand the author's idea that "there is no exact science."

The following quotation from the "Universe" expresses an idea which has been gradually dawning on the world since Bacon's time that:

"All real or absolute proof is actual observation or experience or experiment—seeing for ourselves. I cannot see for the reader; hence he has to get all the actual proof for himself, and make his own discoveries. If there is for him any discovery in this book, he makes it—not I. Hence, logic, which is the formal technique or trick of consistent expression cannot give any real proof. Logic gives expressional proof only and such proof is reduction of expression to truism."

Some of the particular things the book is advertised to do are the following:

"Establishes a sound logic. The logic used by the ordinary man is right; that used by Aristotle and nearly all books is wrong.

"Removes the fundamental error from mathematics, and makes mathematics simple; proves Euclid's 'axiom' about parallels, and intelligibly solves the various problems of non-Euclidian and n-dimension space.

"Revises and unifies the equations of physics. Completes conventional 'theories' of physics—about a dozen, and makes a somewhat new one that is easier:—vortex whirls.

"Shows how gravity works. Shows what is wrong with Newton's law of gravity and why. Makes Einstein's theory actually intelligible—showing that it is one sort of possible language out of an infinite number of possible

valid languages or logics. The book shows that every-day language (Euclid's and Newton's and Christ's) is valid, and the most economical and practical—and uses it.

"Shows intelligibly what electricity, light, matter, energy etc., are. Gives birth, life, death; of solar system.

"Shows how to get energy out of atoms, etc.

"That simple and easy physics is used in the last third of the book to solve qualitatively the more complicated human problems—those of age, growth, death, life, birth, sex, medicine, immortality, good and evil, freedom of will, religious experiences and ethics in general, money, taxes, business principles, value, etc.

"Proves that the Constitution is right, and shows what democracy is, and proves that it is right and that all other forms of government and 'legal' law are wrong.

"Proves (verifiably, of course) the doctrines of Christ; disproves the essential ones of Paul and theologians."

Now at this stage the reader will probably ask himself the question, "Provided it does this, what is the immediate practical benefit to me or to the World?" The following anecdote is related of a visit by Gladstone when Prime Minister of England, to the laboratories of the Great Master of Physical Research, Michael Faraday. Faraday had been to some trouble in explaining or trying to explain to Gladstone one of his discoveries. Gladstone, as a practical man of affairs, immediately asked, "What is its use?" Faraday was apparently chagrined for a moment and then it is recorded that he stated, "Why Mr. Gladstone, what is the use of a new-born babe?" and after a slight pause he continued, "Maybe you can tax it in the future."

The practical technical worth of the book is that it unifies the knowledge and experience of practical theorists and theoretical practitioners. The theorists who won't recognize the value of practical experience and the so-called practical man who condemns all theory, should read the book. Men who have profited by theory, without becoming worshippers of theory and exact science, and who have had experience in producing results, will appreciate the unification of theory and practice by the author.

Men who tell us what ought to be rather than what can be; and those who pride themselves on knowing the exact solution of any problem will not approve the book.

The book will not appeal to worshipers of words. But to those who use ideas, to those who think—*i. e.* observe the relationships existing between events in their experience,—and to those who believe that this world is interesting and worth while even though it has no *exact science*, a careful reading of the "Universe" will not be without compensation, with a word of warning that the "Universe" is hard reading.

J. O. F.

"The Next War." By Will Irwin. Price $1.50. (E. P. Dutton & Co.)

This book is a brief but comprehensive review of the developments and after effects of the World's War, and prophesies what might happen in the next war should the nations of the world become involved in another great conflict.

In a general way, the author reviews the history of war from the earliest records to the present day, with its modern armaments and wholesale methods of slaughter. He explains that the use of poison gas by the Germans, in spite of international agreement, was a logical result of the developments of present day warfare, and predicts that in future wars, gas will be much more extensively employed.

New means of human destruction will make the horrors of the last war pale by comparison. Lewisite, a gas recently discovered in this country, has fifty-five times the "spread" of any other known gas, and is far more deadly. Tanks will be developed into great gas proof, land dreadnoughts. Air forces will be improved and enlarged, and the use of deadly germs seems probable.

These future weapons will not only be used against the actual fighting forces, but the civilian population will be fair game as well, for with "the nation in arms" and all of the resources of a country enlisted to carry on the war, no part of the population will be considered immune from attack.

The author discusses the economic aspects of the late war and the useless expenditures of money for destructive purposes. In 1920, it was estimated that 93 per cent of the national revenue was used in paying up obligations contracted during the last and previous wars, and it is pointed out how much better this money might be employed in the development of our national resources and in other constructive ways. The harmful effect upon human kind through the killing off of the youth of a nation is also touched upon, whereby the old and unfit are left behind to perpetuate the race.

In the concluding chapters, the commanding position of the United States amongst the world powers is pointed out and the opportunity presented this country to use its influence towards world peace. Limitation of armaments is believed to be one of the first steps to be followed by some sort of international agreement or association of nations whereby vexing questions might be settled without recourse to arms.

The author believes that peoples should be educated in the duties of nations to the world at large, and the submersion of selfish interests for the common weal. Some such action should be taken as soon as practicable or else the remembrances of the burdens and horrors of the past war will gradually fade, and the same old questions will arise again to endanger the peace of the world. The best safeguard against war, is a world wide realization that war does not pay.

The book is a small volume that can be read in an evening's sitting, the subject matter is presented in a clear and forceful manner, and its arguments are illuminating and conclusive. Dr. Frank Crane in commenting upon this book says "Unreservedly, I place it as the best book in the world right now for every man and woman in America to read, including the President and the Senate."

H. D. C.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-ninth year of existence. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers upon subjects of interest to the naval profession, as well as by personal support.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy, subsequent to joining the Institute, will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be three dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

Sec. 10. Members in arrears more than three years may, at the discretion of the Board of Control, be dropped for non-payment of dues. Membership continues until a member has been dismissed, dropped, or his resignation in writing has been received.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly. Subscription for non-members, $3.50; enlisted men, U. S. Navy, $3.00. Single copies, by purchase, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ARTICLE, 1923

A prize of two hundred dollars, with a gold medal and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best original article on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the article.

On the opposite page are given suggested topics. Articles are not limited to these topics and no additional weight will be given an article in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All original articles published in the PROCEEDINGS during 1922 shall be eligible for consideration for the prize.

2. No article received after October 1 will be available for publication in 1922. Articles received subsequent to October 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best article published during 1922 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more articles receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. The method adopted by the Board of Control in selecting the Prize Essay is as follows:

(a) Prior to the January meeting of the Board of Control each member will submit to the Secretary and Treasurer a list of the articles published during the year which, in the opinion of that member, are worthy of consideration for prize. From this a summarized list will be prepared giving titles, names of authors, and number of original lists on which each article appeared.

(b) At the January meeting of the Board of Control this summary will, by discussion, be narrowed down to a second list of not more than ten articles.

(c) Prior to the February meeting of the Board of Control, each member will submit his choice of five articles from the list of ten. These will be summarized as before.

(d) At the February meeting of the Board of Control this final summary will be considered. The Board will then decide by vote which articles shall finally be considered for prize and shall then proceed to determine the relative order of merit.

6. It is requested that all articles be submitted typewritten and in duplicate; articles submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

F. M. ROBINSON,
Lieut. Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ARTICLES

Suggested By Request of the Board of Control

The Naval Policy of the United States.
The Navy: Its Past, Present and Future.
The Fighting Fleet of the Future.
Factors Governing American Naval Strength, Absolute and Relative.
The Navy in Battle; Operations of Air, Surface and Underwater Craft.
Escort and Defense of Oversea Military Expeditions.
The Place of Mines in Future Naval Warfare and the Rules Which Should Govern Their Use.
The Relation of Naval Communication to Naval Strategy.
The Influence of Topography on Strategy.
International Law.
Principles on Which Should be Founded the Freedom of Neutral Shipping on the High Seas.
The Present Rule of Neutrality Regarding Contraband and Blockade—Is it Justifiable in Ethics or in Expediency?
What Will be the Status of the Submarine in International Law?
Aircraft—Its Place in Naval Warfare.
Aircraft, Practical Power of.
Aircraft Warfare, Laws of.
Aviation—Its Present Status and its Probable Influence on Strategy and Tactics.
The Control of the Sea from Above.
The Navy Air Service, Its Possibilities, Rôle and Future Development.
The Anti-Aircraft Problem from the Navy's Viewpoint.
Surface Craft, Future Rôle of.
Armor or High Speed for Large Surface Vessels.
Naval Gunnery of To-day, the Problems of Long Range and Indirect Fire.
Mode of Design and Armament of Ships to Meet the New Conditions of Aerial and Sub-Surface Attack.
Future Development of the Naval Shore Establishment.
Naval Bases, Their Number, Location and Equipment.
Strategic Requirements of the Pearl Harbor Naval Station.
The Navy Yard as an Industrial Establishment.
A Mobilization Program for the Future.
Naval Organization from the Viewpoint of Liaison in Peace and War Between the Navy and the Nation.
Organization of a Naval Communication Service.
Scope of Naval Industrial Activity and the Navy's Relation of Naval Strength.
Social and Industrial Conditions in Relation to the Development of Naval Strength.
The Future of the Naval Officers' Profession.
The Naval Officer and the Civilian.
The Naval Officer as a Diplomat.
The Mission of the Naval Academy in the Molding of Character.
The Limits of Specialization in Naval Training.
The Training of Communication Officers.
Navy Spirit—Its Value to the Service and to the Country.
Morale Building.
Military Character.
Amalgamation of the Supply Corps, Construction Corps and Civil Engineering Corps with the Line of the Navy.
The Influence of the Term of Enlistment on the Efficiency of the Service.
Shore Duty for Enlisted Men.
Physical Factors in Efficiency.
Health of Personnel in Relation to Morale.
America as a Maritime Nation.
Our New Merchant Marine.
The Adaptability of Oil Engines to all Classes of War Vessels.